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OBSERVATIONS
ON THE
HISTORY AND CURE
OF THE
ASTHMA;

IN WHICH THE PROPRIETY OF USING
THE COLD BATH IN THAT DISORDER
IS FULLY CONSIDERED.

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P R E F A C E.

AMONG the various chronic complaints to which the human frame is liable, very few can be considered of a more formidable nature than a confirmed asthma. The idea of its being an incurable disorder, its threatening instant suffocation at every attack, are circumstances altogether so alarming to a patient, as must necessarily weaken and depress a mind endowed with the utmost fortitude and resignation. Any remedy then that could be found capable of administering permanent relief, to a person in such an afflicting situation, must be looked upon as of the utmost importance to mankind.

Unhappily, however, the efforts of physicians hitherto, in the asthma, have generally failed in that respect. Hence it is,

that they have feldom in view a radical cure in their treatment of asthma : confcious of the inefficacy of the present practice for producing fuch an effect, they content themfelves with medicines to alleviate pain, and feek not for a balfam to confolidate the wound.

Very lately, indeed, a particular medicine has been highly extolled by an induftrious and ingenious phyfician, and is faid by him to have repeatedly effected complete cures. How far this remedy may be entitled to fuch high encomiums, it will probably require the teft of future experiment to determine. Leaving this matter to be fettled by other practitioners, it is the Author's intention to recommend, in the following Effay, a different mode of treating the asthma, which facts and obfervations evince to be of very confiderable efficacy in the cure of this diforder.

Cold-

Cold-bathing has been mentioned as a remedy for asthma by a few practitioners, but it never has been considered of such utility as to bring it into any general repute. The timidity of physicians, or a want of confidence in such a practice, has raised a prejudice against it, as may be seen by perusing the late writings of some of the most eminent in the profession, wherein the cold-bath is not numbered in the catalogue of remedies.

To be dismayed, however, by such a consideration, would argue a weak and slavish attachment to the systems of men of character, and betray a dread of making any innovation dangerous to opinions established by high authority. In no case whatsoever is such servility more unpardonable than in the present, as in no disorder is there probably greater room for improvement, from the fluctuating and unsuccessful

ful

ful state of the practice in asthma: an undertaking, therefore, to discover how far cold-bathing is adapted to its cure, does not seem to require an apology, but merits some attention from the Public.

As it is the principal object of this Essay, to consider the effects of cold-bathing on asthmatics, and by facts and cautious deductions to render the practice as universal as possible, the Author, of course, cannot enter into a full discussion of the history and cure of the disorder after the manner of former writers. Several observations, nevertheless, have occurred to him on each of these subjects; and as, in his opinion, many of them have been made with accuracy, he thinks it his duty to impart them to the Public.

Kilkenny, July 1, 1792.

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C H A P. I.

EVER since it became fashionable in phyfic to explain the disorders of the human body by means of the nervous system, physicians consider themselves as having very much improved upon the ancients both with respect to their history and cure.

In a particular manner, the asthma may be said to have undergone a change that reflects no inconsiderable degree of lustre on this reformation.

That some advantage has resulted to me-

dicine at large from the modern pathology, it would be unfair to deny; but it would argue an equal want of candour not to admit, that however specious and seemingly conclusive the reasonings of modern writers may appear, very little real or solid benefit have asthmatics derived from their doctrines and opinions.

On turning over the writings of the ancients, we find that the asthma has been pointed out as a distinct disorder from other affections of the chest; and though some inaccuracy and confusion may be detected in their descriptions, by those who wish to find fault with every information coming from this source, and who religiously adhere to the definitions of modern writers, nevertheless an unprejudiced reader will readily discover those strong and peculiar features of the disease amply delineated in most of the ancient writings.

It is true that, from a very early period down to nearly the present time, the title of asthma has been often indiscriminately given to many different complaints of the lungs: but still the characteristic marks of a spasmodic affection of the lungs are preserved in every work of eminence, and are accurately drawn by almost every pen.

Sir John Floyer himself, who had so much experience in this disease, and who has described its various symptoms with such minuteness and precision, has fallen into this error, if with propriety it can be called such; for he arranges, under the head of asthma, several disorders of the lungs that have not the smallest affinity to a spasmodic, or what we in these days strictly denominate asthma.

In another point of view, that merits some attention, we find the ancients and

moderns differ very materially. In the writings of the former, we find the paroxysm of the disorder and all its attending symptoms judiciously drawn, its periodical return very frequently mentioned, with every other circumstance that could be supposed to assist in elucidating its history; but with this difference, that in the intervals of the fits the breathing is alleged to be difficult and distressing: while the latter, considering every such permanent affection of the lungs as the offspring of inflammation, obstruction, &c. insist that a complete intermission between each fit, and a total freedom from disease, are necessary to constitute the essential and pathognomonic signs of this disease.

In order to decide on this point with impartiality, and to settle, if possible, this contrariety of opinion, it is necessary to take a
view

view of the asthma as it occurs in different persons in this climate.

Every practitioner who has attended to the phenomena of asthma, must acknowledge the disease to be very constantly of a mixed and complicated nature, the spasmodic affection being often combined with obstruction from fluids accumulated in the lungs, or from some other very powerful cause. Hence it often changes from an intermitting to a continued type. This is supposed by most of the modern writers to take place in an advanced stage of the disease. They ascribe it to tubercles, water in the chest, &c. brought on by repeated fits of the asthma. But the same attentive observation should inform every practitioner, that even in an early stage the asthma is often of a doubtful nature, and assumes a continued type, at a time when there is not

a possibility of discovering any obstruction that could give it this appearance of a constant and a permanent affection of the lungs.

This, however, is not the opinion generally inculcated in the writings on asthma. If, after it has once been established in the constitution, it should happen to assume for any time a continued type, it is considered to be of a very formidable nature, and to arise from causes that are seldom in the power of medicine to remove. Thus Sir John Floyer says, “ When the asthma continues for some months, it is a true pulmonary asthma, and depends on some disease in the breast, as dropsy, tubercle, abscess, which compress the bronchia; and till that evident cause be removed, it is impossible to cure the asthma fits*.”

* Treatise on the Asthma, p. 120.

But

But Sir John's own case is in direct opposition to this assertion: for he laboured under the asthma at least thirty years when he published his Treatise; and at that time he shewed no symptoms of obstruction, abscess, or any such disorder of the lungs.

In fact, we have frequent instances of persons living to an advanced age, in whom the asthma constantly changes from an intermitting form to a continued one, and, after remaining in this state for a considerable time, returns to its original shape without the assistance of medicine: thus Proteus-like varying its features and appearance according to the causes that may have been applied, to the habit of body, and other circumstances of the patient.

In such cases it would be irrational to suppose that either tubercle or abscess gave origin to the difficult breathing, as these disorders

orders generally carry symptoms of mortality with them, and seldom fail to produce an affection of the breathing that scarcely suffers any intermission.

The present generally received opinion on certain points in physiology, has probably had not a little influence on the minds of physicians with respect to the history of this disease. In conformity to the principles of this system, they consider it to be incompatible with the laws of the animal œconomy, that spasm, properly so called, can subsist for any considerable length of time without being alternated by a state of relaxation. This doctrine I shall not now attempt to combat; but I can venture to say, that I have seen persons subject to frequent attacks of asthma, who, in the intervals of the fits, were affected with a species of difficult breathing continuing for days, and sometimes

times for weeks, that evidently appeared to be of a spasmodic nature.

The case of M'Bay, to be given hereafter, is strictly in point, and highly illustrates this subject: for he had recourse to cold bathing with advantage, and persevered in its use while he laboured under stricture at the sternum, distension of the stomach, cough, uneasiness of breathing, with other symptoms clearly indicating a spasmodic affection.

It is scarcely necessary to mention, that, if obstruction of any kind had a share in bringing on this disorder, cold bathing would have been attended with very serious consequences. This is not the only instance of the kind that I had an opportunity of seeing: several others equally characteristic have fallen under my observation.

In some of them it appeared that the ap-
plication

plication of cold to the lungs in a slight degree, was the principal exciting cause of the symptoms, though no catarrhal affection was present at the time; while in others they seemed to be the remains of the preceding paroxysm not thrown off completely by the constitution, or subdued by the remedies employed *.

Besides

* Doctor Withers has, in my opinion, very properly directed his attention to those cases wherein the asthma is complicated with some other complaint of the lungs. He justly observes, that, when the humoural asthma is united to the convulsive, the patient's breathing is often difficult and disturbed after the fit is over, and continues in that state from the conclusion of one paroxysm to the beginning of another. This he attributes to a quantity of phlegm collected in the air vesicles of the lungs, which harasses the patient until it is dislodged by expectorating medicines, or some other cause.

Treatise on the Asthma, p. 10.

But even in many cases of this kind, the stricture at the sternum just now mentioned, and which is evidently of a spasmodic nature, will be often found to accompany this form of the disease, and to aggravate every prevailing symptom.

Besides this appearance of the disorder in the absence of the fits, anomalous symptoms of asthma very frequently occur without any regularly formed paroxysm; and, as far as can be collected from their complexion and other circumstances, they appear to be of the same spasmodic nature with those just now described.

An author who undertakes to publish the history of any disease, is highly blameable if he omit to detail at full length those symptoms that arise during its progress, and that are found in any respect necessary for determining its just and precise character.

symptom. On no other supposition can we account for the oppressed and difficult breathing that sometimes occurs between the fits. The catarrhal affection no doubt will often contribute to produce this effect; but it is on many occasions altogether so slight and trivial, that it would be highly absurd to suppose it capable of producing such an affection of the breathing as we must often meet with in the absence of the fits.

It

It is not alone sufficient to delineate such symptoms as present themselves in the beginning of the disease: it is on many occasions absolutely necessary to attend minutely to those that come on at a later period, and are found to disturb the phenomena in such a manner as to give it the appearance of a disorder totally different to what it was at its commencement*.

Physicians think they have fully discharged their duty, if, after describing the patient's situation previous to the fit, they bring you to his bedside, point out with ac-

* Secundo, ea symptomata pro notis characteristicis præcipue feligenda putavi quæ perpetuo cum morbo præsentia sunt, et hoc quidem semper annitendum esse putavi. Cum vero plurimi morbi sub eorum decursu aliam atque aliam omnino formam capiant, in his ex serie rerum, et symptomatum sibi invicem succedentium, character sæpè necessario petendus est.

Prolegomen. Synops. Nosol. Method.
Cullen. vol. ii. p. 32.

curacy

curacy the peculiar noise of his breathing, the appearance of his countenance, the state of his pulse, and of every other function that happened at the time to be deranged ; then inform you, that as soon as these symptoms disappear, they leave the patient totally free from disease, but subject to attacks of a similar nature at any future period.

A person who has had any experience in the asthma, must be possessed of little or no talents for observation, who would consider such a history as this sufficient for directing a physician to form a just diagnostic in the variety of cases that daily occur : for though it were admitted to be the ordinary aspect that the asthma wears, the deviations from this appearance of the disease are altogether so frequent, as will necessarily perplex practitioners if not sufficiently on their guard ; at least I have found myself very much embarrassed

barrassed at times, after carefully perusing the best observations to be met with on its history.

In this state of uncertainty, I have been greatly assisted by attending to the following circumstances:—If the chest continue engaged in the absence of the fits without any obstruction or collection of phlegm in the lungs, the patient complains of a stricture at the sternum, somewhat analogous to the tightness that occurs in the fit, but in a slighter degree: his breathing, though not difficult or much oppressed, is by no means totally disengaged: he has a sensation of some weight pressing on his chest, that seems to diminish its cavity, and prevent the dilatation of the lungs. There is a peculiarity in the sound of the cough and breathing, in these cases, that should be closely attended to, and they will be in
general

general discovered, by persons of a nice ear, to proceed from the lungs in a state of spasmodic constriction.

The stomach participates of the affection of the lungs, and is frequently disturbed with flatulence and other symptoms expressive of the deranged state of its functions. The pulse, on these occasions, should not be passed by unnoticed; and it will, for the most part, be found either of a natural quickness, or somewhat below the ordinary standard of a healthy person. If the latter should happen to be the case, lowness of spirits, and other signs of an hypochondriacal affection, will be found its constant attendants.

On the whole, if a person (after having perused the history of this disease as delivered by the ancient and modern writers) compares without prejudice their observa-

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tions with what is presented to his view in actual practice, he will probably agree with me, that, notwithstanding the multiplicity of cases daily occurring, wherein the breathing is perfectly free in the intervals of the fits, instances of asthmatics will be frequently met with, whose breathing continues affected long after the violent fits have passed off, and at a time when no mark or vestige of obstruction could be discovered in the lungs.

Such are the remarks that have occurred to me, on considering the history of this intricate and stubborn disorder. I have very little doubt but that objections may be made to the hints I have suggested. However, it is some consolation to me, to find that I am supported in my opinion by one of the brightest ornaments of antiquity, and at the same time one of the most accurate observers

of the phenomena of diseases, I mean the celebrated Aretæus, who finishes his excellent description of the asthma in the following remarkable words: εν τῇ τῆσι επανεσεσι κῆν

πειῶσι ορθοταβην τῷ παθεῖ φερει ξυμβολα.

De Sign. & Caus. Morb. p. 40. *

CHAP.

* In addition to what has already been said on the nature of asthma, it may not be uninteresting to make a few observations more by way of illustration. In the generality of asthmatic attacks, after the paroxysm has subsided, the patient still feels the remains of the disorder about him; his breathing, from a stricture across his breast, is rendered uneasy, and it continues in that state till the succeeding fit comes on, when this and every other symptom arise to the same pitch as in the preceding. In this manner the disorder generally goes on for several days, and then begins to disappear insensibly, leaving the patient in a short time free from asthma, or any sort of difficult breathing. This is allowed by physicians to be the ordinary course of things in a regular attack of spasmodic or convulsive asthma; and it is worthy of notice, that, even in this simple and uncombined state of the disease, and whether it be of a short or long duration, the uneasiness of breathing very

C H A P. II.

EVER since the asthma became an object of attention with physicians, they have been diligently employed at different times in investigating its causes, and never was there a greater diversity of opinion displayed

frequently keeps its ground between the fits, and is principally kept up by the tightness of the chest just now mentioned. Moreover, when the disorder is protracted to any considerable length, without any decisive intermission, it will very often be found that the paroxysms of asthma will abate of their violence, and almost totally vanish, while the tightness across the chest, and its concomitant symptoms, will still continue to harass the patient. This in truth is so often the case, that it is not a little extraordinary, that systematic writers, in their definitions of asthma, should inculcate no other idea than that of a periodical spasmodic disease, without the smallest

played on any subject whatsoever. One writer ascribes the disease to a defluxion on the lungs, a second to plethora, a third to an affection of the nerves, and so on according to the system that happened to pre-

smallest allusion to a permanent affection, as may be seen by the annexed quotations.

Difficultas spirandi periodicè recurrens chronica.

SAUVAGE.

Respiratio difficilis periodica chronica cum sensu angustiae in faucibus.

VOGEL.

Est chronica periodica respirandi difficultas.

SAGAR.

Spirandi difficultas per intervalla subiens, cum angustiae in pectore sensu, et respiratione cum sibilo strepitu, tussis sub initio paroxysmi difficilis, vel nulla, versus finem libera, cum sputo mucii sæpe copioso.

CULLEN.

I thought it unnecessary to insert the definition of Linnæus among the foregoing, as he runs into the opposite extreme, and defines some incurable obstruction of the lungs, rather than a spasmodic affection of these organs.

vail at the time. There are others who, in order to avoid the imputation of partiality to any system, enumerate all the causes that preceding writers have mentioned, arrange them under general heads, and, without any discrimination of their various intensity and power, ascribe an equal degree of them to each. By these means a cloud of obscurity is thrown over the subject that is not easily dispelled.

It cannot be denied but that there are many complaints in which a number of causes concur to produce the decisive change, from a state of health to that of disease: but in this multiplicity, it is surely the physician's business to point out such causes as generally take the lead, and have the greatest share in the production of the disease; while he distinguishes them from others of less note, that appear but seldom, and should
be

McCull perlegit hunc librum

be considered as fortuitous occurrences, rather than the constant and invariable antecedent causes of the disease.

Great stress has been laid on that state of the body that renders it susceptible of disease. That in every disorder there is a predisposition in the habit necessary for assisting the adventitious and exciting cause to produce its morbid effects, nobody will be so absurd as to deny: but if a writer, in exclusion to the truly conspicuous and efficient cause, exalt this predisposition into a whole instead of making it a constituent part only, such a theory must rest on a very bad foundation. The doctrines of plethora, debility, irritability, &c. the usual resources of physicians in endeavouring to account for other spasmodic diseases, have been plausibly enough transferred by analogy to the asthma.

On some occasions, there are very strong reasons for supposing that one or other of these deviations from a perfect state of health may so far operate, as to subject a person more readily to attacks of asthma than otherwise would have been the case. But if we take a view of those who for the most part become its victims, we shall in general find no one particular temperament or habit of body more liable to it than another.

In this country, the lower order of people who are daily exposed to the various vicissitudes of the weather, who are constantly employed in bodily labour, and possess in consequence thereof a rigidity of fibre and robust constitutions, are very frequently afflicted with asthma—much more so indeed than persons in the higher walks of life, whose frames, enervated by indolence,
luxury,

luxury, and a redundance of humours, become irritable in a high degree, and are prone to various other spasmodic affections. Besides this description of asthmatics, there is a class of artificers that appear to be the greatest sufferers by this disease, such as brewers, bakers, soap-boilers, blacksmiths, and many others*. If these be facts whose authenticity cannot be called in question, any predisposition from plethora, irritability, &c. either in the body at large or in the lungs in particular, does not seem to contribute so essentially to the production of this disease as is generally imagined.

The symptoms of flatulence, indigestion, hypochondriasis, &c. that so constantly accompany the asthma, have in all probability very much misled practitioners. Instead of considering them the natural consequence of

* Vide Withers on the Asthma, p. 38.

the

the disease, as they ought to do, they bring them forward as an argument in support of a contrary opinion. They suppose that such symptoms always indicate a weak, lax, and irritable fibre; and that any disorder, as the asthma, arising in such a habit, and attended with complaints of this nature, must be the offspring of nervous debility. Hence the idea of nervous and hysteric asthma first took its rise. This, however, is a very false mode of reasoning.

Take, for example, a person of the most vigorous constitution, whose stomach, previous to the asthma, would subdue the most viscid and indigestible species of aliment; behold him after several attacks of his disorder, and you will often find his appetite materially injured, the tone of his stomach impaired, while flatulence, distension of this organ, and various other nervous symptoms,

toms, as they are called, will constantly follow *. This is in fact so often the case with asthmatics, that very few exceptions occur to the contrary.

To discover the source of the errors on this subject, we must go back as far as the

* Dr. Percival remarks, that physicians and physiologists have paid great attention to the influence that the stomach when diseased has on the lungs, but that they have taken little notice of the converse of this. He gives a case of humoural asthma, in which the patient could take several drams of vin. ipecac. at the commencement of the disease; but as his disorder increased, the irritability of his stomach became so great, that 15 drops of the same wine often acted as an emetic.

Percival's Essays, vol. ii. p. 394.

Dr. Percival is certainly just in his remarks on the negligence of physicians with respect to this subject, yet it would be an endless task to enumerate all those cases of asthma, in which the stomach is deranged in consequence of the disordered state of the lungs: for in fact very few asthmatics can be found (let the previous state of their stomachs be what it may) who will not in length of time suffer materially from flatulence, distension, and other symptoms of a debilitated state of this organ.

time

time of Dr. Willis. Before he published his Treatise on the Asthma, though medical writers described its symptoms with tolerable accuracy, they never considered it a spasmodic disease, or that it could be brought on by powers applied to the nervous system, or moving fibres.

This celebrated physician perceiving, after the disorder had once taken root in the constitution, that it was easily renewed by causes whose operation could not be explained on any other principle than this, extended the idea farther, and was of opinion, that all those various causes, such as heat, passions of the mind, &c. that are capable of bringing on a relapse, are equally effectual in giving rise to the first attack in persons predisposed to the asthma*.

This

* Quicquid igitur sanguinem effervescent inque organum concitat, uti motus violentus corporis aut animi, frigidus

This doctrine, in its fullest extent, has been received into almost every work published on the asthma from that period down to the present time, and has been adopted with the most implicit confidence by every practitioner: any attempt of course to overturn a system supported by such authority, may be considered as no small degree of presumption, and will probably meet with a very ungracious reception. Facts in themselves absolutely incontrovertible have been adduced by a variety of writers on this subject; but the conclusions that have been drawn from them, are in my opinion neither just nor philosophical.

Thus it is universally known, that after two, three, or more fits of asthma, the lungs

frigoris aut caloris externi excessus, vini potus, venus, quinimo interdum merus lecti calor, prædispositis insultus asthmaticos accersit.

Willis Oper. Omnia, à Blasio, p. 208.

become

become so extremely irritable, and so readily disposed to fall into their former spasmodic state, that various kinds of stimuli, and many of them of an apparently mild and inoffensive nature, will be productive of asthmatic paroxysms. But does it necessarily follow, that, previous to any appearance of fits, or any habit being formed in the system, they are capable of producing such violent effects in constitutions the most healthy and vigorous? I suppose it does not; and however natural the transition and analogy may appear, it would be as erroneous to argue from the one case to the other, as it would in the instance of an intermittent fever, to exalt to the rank of primary causes every irregularity or stimulus that is found to bring on a relapse, after a stop has been put to the disease.

In illustration of this, it will suffice for
the

the present to observe, that physicians, on finding what bad effects the change from a heavy to a light atmosphere sometimes produces on asthmatics, have fallen into the error of placing a diminution in the weight of the air among the primary causes of the disease, though no one well authenticated instance of such a fact can be adduced, as will be satisfactorily proved hereafter. Objections equally valid can be brought against many of the other causes that have been assigned by medical writers.

Hence we should be very cautious how we take for granted the many cases of asthma recorded by medical authors, that are said to originate in such causes, as they will be found for the most part the offspring of an ill-founded though plausible theory, and not the result of a minute enquiry or accurate observation. Moreover it is worthy
of

of notice, that the authenticity of several cases of this kind rests very frequently on the degree of credit that is due to the patient's narrative; and if men of science and erudition be so liable to error on this head, we cannot be surpris'd at the mistakes or misrepresentations of patients in general: for it must especially depend upon the proper and judicious interrogations of the physician, and his capacity for distinguishing the probable from the improbable causes, how far he may be able to arrive at any degree of certainty.

From what has been now advanced, I would not wish to have it understood that I meant to exclude altogether the causes in question. I can readily conceive how an acquired degree of irritability or sensibility, in certain habits, may so far predominate in the lungs, as to expose such persons to fits of asthma
from

from trivial causes, as passions of the mind, a light atmosphere, &c. &c.: but still I am convinced that this is not a common occurrence. The history of a patient will be related in the course of this work, who, after repeated nervous and hypochondriacal attacks, at length got a nervous asthma, that returned at regular and stated periods. A person in the habit of reasoning according to the principles of the present fashionable system, would not hesitate a moment to pronounce the asthma, in this case, to be the effects of the preceding nervous complaints, without the assistance of any adventitious power; or that some very trifling one had stirred up the disorder, already in a latent state in the constitution. However, there is very little doubt but that the application of cold was the sole cause of the first attack in this patient. He was very constantly

D

exposed

exposed to the night air in the most inclement season of the year, previous to the appearance of the asthma; and even after this was in a great measure subdued, exposure to cold was the only cause that seemed to have any effect in occasioning a relapse.

In some cases we can with tolerable certainty mark one particular state of the lungs that seems to establish a strong predisposition to the disease. This is a mal-conformation of the chest, apparently at times connected with an hereditary taint, but more frequently independent of it. In this situation the lungs being confined in too narrow a space for their bulk, are easily stimulated to irregular spasmodic action, by various kinds of irritation. I will relate a case in point. A person of my acquaintance, from a narrow and contracted chest, is subject to transitory fits of difficult breathing: fatigue, particularly

ticularly from walking too fast, the sulphur and smoke of coals, and any passion capable of agitating the frame, is frequently followed by a paroxysm, which disappears in a few minutes, and leaves him in a perfect state of health. But it is a doubtful point whether, in the strict propriety of medical language, this disorder can be denominated asthma, as it is not preceded by the signs peculiar to this disease, nor, in its duration or phenomena, has it the characteristic marks of a genuine confirmed asthma. At most it is but a very slight species of the asthma, though, from the very irritable state of the lungs, it is evident that the predisposition is as strongly marked as in any case whatsoever. From this fact (if a solitary one can have any weight) it may be inferred, that the exciting causes of asthma must be of a more powerful nature than is

commonly supposed to produce a formidable disease, let the tendency in the habit be ever so predominant.

Though it would look like scepticism to deny that the seeds of the asthma are sometimes transmitted from parents to their offspring, yet too much pains have been taken by writers to persuade the world that this is most commonly the case. This opinion, as far as I am able to judge, was founded on the inefficacy of the remedies that were generally employed, rather than on the more faithful and unerring testimony of observation. Physicians supposed, as the disorder seldom or never yielded to the power of medicine, that some hidden and unconquerable cause had fixed its roots deep in the constitution; and as an apology for the healing art, and to save themselves the pains of farther investigation, they have
thought

thought proper to charge this to the account of an hereditary taint. Happily however the case is otherwise. It would be nugatory to dwell on the many arguments that might be advanced to overturn this pernicious doctrine. Let it suffice for the present to say, that the causes of the disease are often so manifest, as not to elude the notice of the most careless and inattentive observer; that on the most minute enquiry it cannot be traced to any defect on the side of parents or their ancestors; and that it can be very frequently subdued, if proper remedies be administered in due time, and with judgment.

From the foregoing strictures, it is pretty clear, I suppose, that too much hurry and inattention have been shewn by physicians in their investigations of the causes of asthma. Taking into the account such cases as

arise from an hereditary taint, from mal-conformation, and from different accidental causes, as in smelting of lead, &c. I will still venture to say, that in 99 cases of 100, the application of cold to the lungs is, in this climate, the chief and principal cause of laying the foundation of this disease, of bringing on the attacks, and of continuing it after it has once taken place.

C H A P. III.

IN a climate like this, where cold and moisture so constantly unite, it is natural to suppose, that many of the disorders incident to it, particularly those of the lungs, are in a great measure owing to the influence of such a combination. The asthma may with propriety be set down as one of the number. At least the effects of cold are often observable, if the disorder be carefully attended to at its commencement. For some days before the asthma is completely formed, the patient frequently complains of an uneasiness of breathing, cough, pains in his head, and other parts of the body. Sometimes a strong tendency to inflammation

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tion

tion takes place; and in consequence thereof a pain or stitch in either side is frequently felt, together with a sensation of cold in different parts, analogous to what occurs in catarrhal affections. If, together with these symptoms, a stricture be felt at the sternum, an asthmatic paroxysm may be expected to supervene very shortly, unless prevented by timely applications. The appropriate remedies for such threatenings of asthma are bleeding and blistering, which have often, to my knowledge, warded off the impending attack.

It is necessary to remark in this place, that these precursory symptoms do not take place in the exact order, degree, or number in which they are set down: they will frequently vary according to the difference in the intensity of the cause, the previous state of the patient, and many other circumstances.

stances. However, in fact they are the common and usual effects of the action of cold on the lungs, and differ in no material point from the ordinary symptoms of a catarrhal affection but in this, that in proportion to the degree of inflammatory tendency, and state of the pulse, the breathing is more oppressed than is usually the case in catarrh.

On these occasions an acute observer can often foresee the storm gathering, and guard against it with success: but this is not always in his power, as in many instances no alarm is given, and the disorder comes on in the most sudden and unexpected manner, without any of those symptoms that so constantly attend the operation of cold. Lying in women, and persons after recovery from fevers and other disorders, by unguardedly exposing the body to cold in a state of perspiration,

spiration, are, according to my observations, very liable to attacks in this way. In other habits the constitution is able to resist the action of cold, though frequently renewed, for months, and sometimes for years, till, by the frequent repetition of the same cause, the lungs become materially injured in their functions, they lose their elasticity and tone, and at length give way to its impulse. An asthma brought on in this manner is generally of a very obstinate nature.

Those who consider the asthma to be principally a nervous affection, and to arise from causes that operate on this system without the concurrence of cold, do still admit that the humoural asthma, as it is called, proceeds in a great measure from the operation of cold on the lungs. This opinion is formed in consequence of its being constantly accompanied with cough, spitting, and

and other signs of a catarrhal complaint. Let us see how far this test may be relied upon. A physician must be possessed of very little discernment, who has not noticed at different times a considerable discharge of phlegm from the lungs, in every species and variety of asthma; in the hysteric and convulsive, as well as in the humoural and plethoric. Nay, what appears still to be more worthy of remark is, that practitioners will often find the nervous and convulsive kind, with its stated and periodical attacks, attended by a copious expectoration of phlegm; while other species of a doubtful and irregular nature, in which a person could distinctly trace the application of cold, discovered no such symptom. How then can it be alleged with any confidence, that the existence of such an affection as this should constitute any specific

specific difference, and be established as a criterion for ascertaining the cause of the disease?

In general, it is not from any difference in the cause, but from a difference in the disposition of the bronchial glands to pour out the mucous fluid, that one asthmatic coughs up large quantities of phlegm, while another has little or no tendency to it. Thus some people with slight catarrhs are accustomed to spit very freely; while others in the same situation, and in every degree of the disorder, from a slight cold to a confirmed inflammation of the lungs, bring up little or no phlegm by coughing.

Sir John Floyer himself (though he asserts that they originally proceed from different causes) owns, nevertheless, that as to their symptoms and phenomena they are exactly alike; and after some time the fits in
both

both species are brought on by the same means*.

The justly celebrated Morgagni has remarked, that many practitioners under the

* Whatsoever causes produce the fit of the hysterical asthma produce the same in the spitting asthma, as changes of weather, heat and cold, violent motions, passions, wine, surfeits: in neither kind of asthma can they bear the heat of the bed. Since the same causes produce the fits in both sorts of asthmatics, there is certainly the same effervescence in both which occasions the fits, and that is plainly proved: for at the end of the hysterical asthma fit, the water appears feverish, with a thick sediment: and I observe that there is the same interval between the hysteric asthma fits, as there is in the spitting asthma: and there is the same quantity of pale water in both kinds of asthma.

Since therefore these two kinds agree in the same sort of constriction of the bronchia, in the same effervescence of humours occasioned by external causes; all these two kinds differ in is the first occasion that produces them, and the spitting attends the one and not the other; the reason of which I impute to inflammation of the lungs or a catarrh, and the other arises after hysterical fits or a fever.

Floyer's Treatise on the Asthma, p. 114, 115.

influence

influence of Willis's doctrine of asthma, have been so much deceived by false appearances, as to treat disorders of the lungs that evidently arose from obstructions, for nervous and convulsive asthmas. Such a caution coming from a man of Morgagni's distinguished abilities should have its due weight with physicians, and deter them from relying with so much confidence on a doctrine, that in several instances has been attended with consequences of a very serious and alarming nature *.

Hence,

* Postea vero quam Willisius persecutus est fufius convulforum nervorum effectus in diffitis quibusque partibus: medicorum plerique non modo cum oportuit, hanc illius sequi doctrinam cœperunt: sed haud raro etiam hujus facilitate et commoditate illecti, interdum quoque fallaci rerum specie decepti, abusi sunt usque adeo, ut cum organorum vitia non deessent, nihil nisi convulsiones in multis morbis, præsertim vero ad respirationem attinentibus, accusaverint non secus ac veterum plerique

Hence, in every recent attack of convulsive asthma, if we cannot trace it to the effects of cold on the lungs, or to some defect in the formation of the chest, an organic obstruction in some of the internal parts may be strongly suspected: at least physicians are not justifiable in laying down any plan of cure, until every circumstance with respect to this point be examined with the utmost deliberation.

Physicians can easily conceive how spasmodic complaints of the stomach and bowels may be excited by cold: but if a similar affection of the lungs be in question, instead of ascribing it to so obvious and natural a cause (as might be expected from its very constant and decisive influence on these or-

plerique accusabant vapores, Qui abusus nisi caveamus quam facilis sit non una in proximis epistolis docebit historia.

Morgagni de Caus. et Sed. Morb. p. 131, t. 1.

gans),

gans), passions of the mind, a change in the specific gravity of the atmosphere, &c. are had recourse to, in order to exhibit a rationale more consonant to a nervous and convulsive disease. In all those persons, as the common people and tradesmen of this country already spoken of, and who were found to be the greatest sufferers by this disease, the trivial causes commonly assigned cannot, by the most zealous advocates for the nervous doctrine, be considered of sufficient magnitude to produce effects of so formidable a nature as we are witness to every day: and unless a predilection for scepticism, and a desire of explaining all spasmodic disorders by means of the nervous system, should bias the judgment, a satisfactory explanation of such cases of asthma will be often discovered in the operation of cold on the lungs.

If,

If, after all this, it should still be doubted whether the cold of our climate be capable of producing the flatulent, hyſteric, or any other ſpecies of nervous aſthma, a few well authenticated facts, drawn from writings of no inconfiderable authority in medicine, will clear up this point.

Narciſſus, vir xxxviii annorum, temperamenti cholericò-fanguinei, tribus circiter ab hinc menſibus Francofurtum ad Viadrum profeſtus ſub itinere, febre multo vomitu ſtipata corripitur: a quâ datis a quodam medico potiunculis diaphoreticis et temperantibus liberatus, ſub diſceſſu de crebris in latere dextro puncturis conqueri cœpit. Redux et per ſex circiter dies domi commoratus, Stetinum quinque milliaribus a loco in quo degebat diſtans nave aperta proficiſci decrevit. Conſcendit quoque illam hora vespertina ſexta, levi indutus amiſtu, et non ſolum ſuborta mox tempeſtate pluvioſa,

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verum

verum etiam aëre ac cœlo per totam noctem inclementi atque horrido, refrixit. Accedens Stetinum, et biduo ibidem sub illibata fanitate commoratus, tum de insigni præcordiorum anxietate et omnium artuum lassitudine conqueri cœpit. Hinc protinus domum reversus, mox corripitur previo horrore brevi, æstu insigni cum ingenti anhelatione, ac si suffocari vellet aliisque symptomatibus stipata: quæ insequenti nocte magis invalescebant cum puncturis sinistri lateris. Quare vena in dextro pede statim incisa, mox evanuerunt dictæ puncturæ: sed cum reliqua symptomata non solum insisterent, verum etiam dysuria ac flatulentia accederent, medicum absentem accersit aeger, qui congruis medicaminibus novissimas binas adfectiones profligavit quidem, at constrictionem asthmaticam debellare haud potuit.

Freder. Hoffman. Consult. et Resp. M. t. i p. 404.

Casus lxxxix. De Asthmate Spasm. Flatulento.

On

On reading the foregoing history, it is evident (laying aside every sort of theory) that this flatulent spasmodic kind of asthma, as Dr. Hoffman calls it, was brought on by cold.

Narcissus, in a few days after recovering from a fever, undertakes a journey very lightly clad, in an open vessel, and on a wet, cold, and stormy night: in two days after, he is attacked with cold shiverings, succeeded by heat and violent suffocations threatening immediate death. When such symptoms are accompanied with stitches in the side, and on such an occasion as this, it would be absurd to ascribe them to any other cause but cold.

Bleeding had the effect of instantly banishing the stitches, and the other means that were used so far succeeded as to remove the symptoms of dysuria and flatulence: but the spasmodic stricture at the chest still

remained unsubdued, and never quitted him till it brought on other disorders that in all probability terminated in his death.

In this case, the continuance of the stricture at the breast, after the violence of the disorder was subdued by bleeding and other remedies, is a proof that the spasmodic affection is often of a permanent nature in the asthma, and makes it assume a continued type.

Quum aliquot abhinc annis in Carolinis degerem fontibus ; accessit illos vir quidam generosus, qui in intemperantia potûs et frigori intenso sub quo pectus ipsi libere exponendo iter fecerat, ab aëris inclementia, asthmaticum sibi met contraxerat morbum.

The following reflections of Dr. Hoffman on this case merit particular attention :

Quemadmodum frigus omnibus nervosis partibus infensum est : ita maxime pectori
deprehen-

deprehenditur inimicissimum. Quamplures mihi cogniti sunt casus ubi ex eo solo liberalius admissio tusses, asthmata spasmodica, et cardialgiæ atrocissimæ propullulârunt. Hinc non rarum est eos qui venatoriis aut aulicis muneribus præsumunt, et pectori uti mos est minus tecto incedunt, ejusmodi affectibus infestari. Etsi nostrum conferamus casum, non sane ex alia causa originem traxit asthma quam ex frigore pectori admissio: siquidem æger venationibus indefessus vacavit, nudoque pectore sub gelidissimo cœlo incessit. Quod cum forsan inconvenienti tractatum sit medela: omnino in hydropem pectoris tandem degeneraverat.

Hoffman. Medic. Rat. Syst. t. ii. p. iii. p. 353-4.

Besides these testimonies from Dr. Hoffman in favour of the operation of cold in producing asthma, he has another passage which is still if possible more expressive. After enumerating the different causes that

lay the foundation of this disease, he concludes his subject in the following manner :

Si quid ex causis occasionalibus est quod asthma convulsivum inducere potest, certe est externum frigus, hostis ille nervoso generi inimicissimus. Unde hyemali tempore flantibusque ventis aquilonaribus ingravescit malum : et a frigido quoque potu exacerbatur. Imprimis observavi illos qui pectus non bene tegunt, illudque frigori maxime nocturno exponunt, sæpius hoc malum incurrisse.

Dr. Willis himself, who made so material a change in the pathology of asthma, and considered it in every respect a nervous disease, gives us, notwithstanding, a case of convulsive asthma that evidently arose from cold.

Senex perhonorificus multis magnisque titulis insignitus, iisdemque omnibus major,
postquam

postquam per aliquot annos unaquaque hyeme tussi cum sputo moderato et satis benigno obnoxius degisset, sub finem novissimi autumnii, a longo itinere domum reversus (a frigore uti putabatur suscepto) minus recte valebat. Querebatur enim de dolore in medio pectore juxta sternum excitato, qui vesperi quamprimum lecto incalesceret, ingravescent somnum perturbabat, et plurima nocte valde molestus erat, sine quavis tamen dyspnœa, aut asthmatis signo evidenti.

Ad dolorem hunc tollendum, et purgatio et phlebotomia celebratur, pectoralia et antiscorbutica quotidie exhibentur, loco dolenti linimenta et foci applicantur, sine magno tamen fructu aut levamine: nam quæ deinceps alteratio contigit, potius in deterius cessit: nam dolori paulo remissius habenti, respiratio difficilis et impedita supervenit, ita ut a primo somno aut appulsu ejus statim asthmaticus fieret, atque anhelus, et circa

præcordia laborans in lecto erectus federe
cogeretur.

Porro hujusmodi dyspnœa et spirabilium
agitatio convulsiva, non modo quovis ves-
peri redibant, sed indies immaniores factæ
longius durabant: proinde ut nocte quadam
a primo somno evigilans asthmatis paroxys-
mo gravissimo, qui ipsum tantum non in-
teremit per plures horas afficeretur.

Willis, Opera Omnia à Blasio, p. 213.

De Medicam. Operatione.

On reading the preceding cases and ob-
servations, no person, I suppose, will be so
hardy as to deny the possibility of every form
of asthma from the operation of cold, inde-
pendently of any other cause: and if a mul-
tiplicity of them were in any respect neces-
sary for giving additional plausibility and
weight to this opinion, the records of physic
would readily supply us with them.

From this source also, even at its origin,

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it is possible we may be able to draw a farther corroboration of our doctrine of asthma: for it will be found, that the theory under consideration was embraced in the earliest annals of medicine, when the human mind, possessing its native independence, had no particular bias for any system, but recorded with fidelity whatever nature presented to its view.

If we look into the works of the venerable Father of physic, we shall find no particular section or chapter allotted to this disease. In the course of his writings, however, he takes frequent opportunities of mentioning the asthma, and that in such a manner as to leave very little doubt on the minds of his readers, that it often engaged his attention, and that he was intimately acquainted with its nature.

These detached and scattered passages, have called forth the exertions of different
authors,

authors, particularly those of Galen, who has given us a very elaborate commentary on aphor. 26, lib. 3; aphor. 46, lib. 6, and other parts.

But his intended illustrations on those seemingly obscure and mutilated passages, instead of affording us any assistance in elucidating them, and giving us a clue to the sentiments of Hippocrates, rather, in my opinion, pervert the intention and meaning of this illustrious writer.

Not to dwell particularly on those parts in which he has mistaken the sense of the original, it is sufficient to observe, in general terms, that in no one of his remarks has he done justice to it: his description of the asthma does not differ in any material point from dyspnœa, or any species of difficult breathing, and of course it cannot convey to us an adequate idea of a spasmodic affection of the lungs.

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These annotations of Galen being then inadmissible, it will be necessary to discover if any other hints thrown out by Hippocrates on this disease, will admit of a different explanation.

Hippocrates, enumerating the various complaints that occur at different stages of life, sets down the following as disorders to which the human frame is particularly liable, after the period in which spitting of blood and consumptions of the lungs are most frequent.

Τοῖσι δὲ ὑπὲρ τὴν ἡλικίαν ταύτην ασθματα πleuritides περιπνευμονιαι. Aphor. 30, lib. 3, sect. 7.

It appears extremely probable that Hippocrates, in placing the asthma here in contradistinction to pleurisy and peripneumony, must have had in view the spasmodic kind. We shall the more readily adopt this opinion, if we attend to the succeeding aphorism, where he says, that old men are very
 2 subject

subject to difficult breathing, coughs, and catarrhs or defluxions on the lungs.

Τοις δὲ πρεσβυτησι, δυσπνοιαι, καταρροί, ἐνχλωδεες.

Aphor. 31, *ibid.*

Here we are to suppose that Hippocrates, in taking notice of the greater part of the disorders of the lungs, and in giving an appropriate term to each, had a clear and distinct idea of their nature and symptoms; and if this be the case, he could not possibly distinguish the asthma from the rest of the pulmonary disorders, in any other manner than by marking with accuracy those symptoms that are peculiar to it as a spasmodic disease. That he formed such an opinion of the nature of asthma, will appear pretty clearly from a passage quoted by Dr. Millar, in his excellent Treatise on the Asthma of Infants.

Τοις δὲ παιδίοισιν, ἐπιπιπτειν σπασμοὶς καὶ ἀσθματὰ ἂν νομίζουσιν τὸ παιδίον ποιεῖν καὶ ἱερὴν νόσον εἶναι.

Hipp. Oper. Omn. à Fæbio, p. 281.

Hippocrates,

Hippocrates, speaking of the effects of cold and moisture on the human body, and of the disorders which such a state of the atmosphere produces, makes use of the foregoing observations.

Whether we suppose, with Galen, that Hippocrates hinted at the epilepsy by the epithet *ἰσχυρῆ*, or, if we content ourselves with an explanation that will readily occur to every intelligent reader of this passage, that the appearance of the disorder was altogether so formidable as to induce the vulgar and uninformed spectators to believe that it was sent by the gods for some particular purpose; in either sense we are warranted to conclude, that the disorders alluded to by Hippocrates, under the title of *asthmata*, were of a spasmodic nature. For if by this term he meant an affection of the lungs, of which there cannot be the smallest doubt, no disorder of these organs except a spasmodic

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dic and convulsive asthma exhibits such terrifying symptoms as to form any grounds for a parallel with the epilepsy, or for believing that it was the effect of an immediate interposition of a supernatural power. Hence, without putting any forced construction on the words of Hippocrates, it appears that the asthma mentioned by him was of the spasmodic kind, and that he considered cold and moisture its principal causes. At least it must be allowed that this was his opinion with regard to the disorder in children.

We shall next direct our attention to another writer of antiquity, and see how far his sentiments coincide with those of the Father of physic.

Celius Aurelianus, in giving a history of the asthma, writes like one who delivers a true and faithful account of whatever was presented to his view in actual practice: no
weak

weak or futile theory is substituted for facts and accurate observation.

Gravat autem (says he) asthma atque premit magis mulieribus viros, et juvenibus senes, atque pueros et durioribus natura corporibus teneriora, hyberno atque nocte magis quam die vel æstate: in quibusdam perfectis irruit passionibus: sed magis ex profundo frigore sequitur patientes spirationis difficultas, et frequenter natura celerior magis quam tarda.

Every physician conversant with the asthma, must acknowledge that we have here, as far as it goes, a just and accurate account of its history. What in my opinion stamps it with no inconsiderable degree of merit, is the cause that is assigned for the production of the disease: sed magis ex profundo frigore is the express opinion of this ancient writer ; and there is so much truth in the remark, and it is founded on so solid
and

and firm a basis, that it deserves to be revived in modern times, and raised into a system.

Indeed, if the greater part of the earlier writers be consulted on the asthma, though the same abilities in ascertaining its cause cannot be discovered in their works, as in those of Celsus Aurelianus or Hippocrates; yet the prevailing doctrines among them seemed to be the result of a careful observation of the symptoms that constantly took place, and led to a practice not only rational but successful.

Thus, from the difficult breathing, cough, spitting, and other symptoms of asthma, it appeared to them that there was a flow of humours to the lungs, which they called a defluxion, absurdly imagining that they descended from the head to the chest, being previously drawn up by this organ from the lungs.

This

This explanation, however vague and ridiculous it may appear, was productive of no evil consequence. The fact being established with respect to the determination of morbid humours to the lungs, or to a redundancy of such as were found, happily directed a practice of the most salutary tendency: vomiting, purging, and other evacuant remedies came to be employed in the incipient state of the disease, and were constantly crowned with success.

Even at an after period, and when the disorder ran into a chronic state, their instructions for asthmatics have not been followed in vain by practitioners of experience in modern times. Thus Sir John Floyer *

has

* I found I had read most of the modern writers, and hitherto had tried their methods, and hot pectorals and cephalics in vain. I believed by my ill success in their way that they never understood this disease; and therefore turned over some of the old writers, Galen, Ægineta, Ætius, &c. where I found more rational notions,

has borne public testimony to the superior efficacy of their practice, and affirms that he obtained more lasting benefit from their prescriptions, than from any of those that were published by the modern physicians of his time.

Having laid before my readers this account of the doctrines of the ancients with respect to the asthma, I shall take the liberty of making a few remarks on some passages in Dr. Millar's treatise on the same subject, already mentioned, as they appear to be a strong corroborating evidence in support of the theory under consideration, though brought forward by this ingenious writer for a very different purpose.

He sets out with a description of the soil, extent and situation of the different countries, and was directed by them to the use of that medicine which does very much relieve and prevent my fits, of which I will hereafter give an account.

Treatise on the Asthma, p. 15.
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tries wherein the asthma was found to be most prevalent, recounts the diseases that rage at particular seasons, gives a minute account of the state of the weather which he thinks produced them, and concludes his observations in the following summary manner :

“ Such was the state of the weather,
 “ which at this time introduced the asthma,
 “ and such were the concomitant diseases:
 “ and as there was little variation in succeeding years, it is sufficient to observe in general, that from a meteorological register, very accurately kept by an ingenious clergyman, for almost fourteen years, compared with a journal of diseases during that period, it appears that the asthma was more or less frequent according to the state of the weather; that it prevailed most in spring and autumn, and especially in moist seasons accompanied with east and

“ north-easterly winds; when the weather
 “ was variable; when the mercury in the
 “ barometer was fluctuating, but generally
 “ low; and when sudden changes from
 “ frost to thaw were very frequent.”

Millar's Observations on the Asthma and
 Hooping-Cough, p. 13.

A person divested of every sort of prepossession in favour of any particular theory, on perusing the preceding observations relative to the asthma, could not, in my opinion, hesitate a moment in forming a decision as to its cause. But let us see the superstructure that Dr. Millar has raised on this foundation.

“ From the history which has already
 “ been given of the asthma, it appears that
 “ it is chiefly incident to children, especially
 “ such as have been lately weaned; and that
 “ it has been most prevalent in spring and
 “ autumn, moist seasons, changeable weather,
 “ ther,

“ ther, and when the mercury stood low in
 “ the barometer.

“ However unsatisfactory the conjectures
 “ may be which have been formed con-
 “ cerning the influence of a light atmo-
 “ sphere in producing diseases, yet the
 “ fact stands confirmed by the concurring
 “ testimony of physicians in all countries,
 “ and in all ages. An extraordinary
 “ instance of the lungs being affected by
 “ such a constitution of the air, is related
 “ by Dr. Mead in his Treatise concerning
 “ the Influence of the Sun and Moon upon
 “ the Human Body. And if we have not
 “ been grossly deceived by the relations of
 “ travellers, the sudden change from a
 “ dense to a light atmosphere, in ascending
 “ high mountains, renders respiration very
 “ difficult.”—Ibid. p. 67.

“ When moisture is joined to such a state
 “ of the air, it becomes still more injurious ;

“ the superfluous serum, which ought to be
 “ thrown out by expiration, is accumu-
 “ lated ; the fibres become turgid and œde-
 “ matous ; and the organs of respiration
 “ are weakened.”—Ibid. p. 69.

Those who labour under no defect of the lungs, for the most part bear with impunity very considerable changes in the specific gravity of the atmosphere : even many persons have resided for several weeks on very high mountains, without finding their respiration affected, as was the case with Messrs. Bouger and La Condamine, on Pin-chinea* in America. Others affirm that they experienced no difficulty of breathing on the Pike of Teneriffe.

The disorders that are generally said to attack those who visit such mountains, are hæmorrhages from different parts of the

* Zimmerman's Experience in Physic, vol. ii.
 p. 111.

body, as from the lungs, nostrils, eyes, &c. They are accounted for in this manner:—The impediment that is given to the propulsion of the blood through the vascular system, being in part removed by the diminished pressure on the tops of mountains, the fluids are propelled with greater force by the *vis a tergo*; hence the small vessels becoming more and more distended, a rupture of such of them as are least capable of resistance takes place *. This seems satisfactory enough; though there are some who contend that the cause of such discharges of blood is to be sought for in some accident, and not in any diminution of the weight of the atmosphere.

However philosophers may disagree about this point, they all allow that there is not one well authenticated instance of a con-

* Vide Percival's Essay, vol. ii.

firmed asthma in consequence of the change of air from the lowest to the highest situations, by the ascent of mountains, or by the flights to the upper regions, as in the late practice of aerostation. Hence it is but reasonable that we should reject the explanation given by Dr. Millar, as it is scarcely possible that the slight variation of the atmosphere mentioned by him (though assisted by moisture) could produce such violent effects as an asthma, so general at times among children as to amount nearly to an epidemic distemper.

It being found by experience, that many asthmatics, on their removal from a thick and heavy to a light air, were immediately attacked with their disorder*, physicians
have

* I have found London air and that of Holland agree best with me; and by going into a sharp air, I have immediately fallen into a shortness of breath, particularly in my going from London to Epsom; but upon
my

have hence rather precipitately concluded, that such a cause was sufficient of itself to give origin to the asthma. But many different causes (as we already remarked) will affect the asthmatic after the disease has taken root, that would not produce any morbid symptom, had they been applied before the lungs were injured by its frequent attacks: so a light atmosphere, by not giving the ordinary degree of distension to the lungs, may disagree with an asthmatic, or occasion a relapse, though it could not possibly produce any effect on the same person before the asthma appeared.

If we attend to the fact stated by Dr.

my return next day to London, I was very well. I have had severe fits in London; none in Holland, but a little heaviness, which the Jesuits Powder put off immediately. Eating a supper or any thing in an afternoon occasions my fits: but in the beginning of my fits supper agreed well with me.

Floyer's Treatise on the Asthma, p. 21.

Millar,

Millar, that the species of asthma which he treats of prevailed most in wet and moist seasons accompanied with east and north-easterly winds, there surely can be no difficulty in forming a tolerably just idea of its cause, except we wish to substitute sophistry for reasoning, and subtlety for common sense.

Such weather as this is well known to be injurious to the lungs, and is constantly found to be productive of catarrhs, pleurifies, and other disorders of this sort: and Dr. Millar himself remarked, that, in October 1755, inflammations of the bowels, and the iliac passion, were very prevalent at the same time with the asthma*.

This shews to a demonstration, that we are not to refer the cause of this species of asthma to any change produced in the

* Observations on the Asthma, p. 11.

weight of the air: for it would be highly absurd to ascribe inflammation of the bowels, or the iliac passion, to a diminution in the weight of the air; and the argument will hold equally good with respect to the asthma that happened to rage at the same time.

When the causes of asthma underwent an investigation, many facts and observations were adduced, which tended to prove, in a satisfactory manner, that the application of cold to the lungs was by far the most frequent cause of this disorder. If this be the case, does not the most striking analogy authorize us to assert, that the asthma which raged during the prevalence of east and north-easterly winds originated in the same source?

To obviate the force of these arguments, it may perhaps be alleged, that the disorder in question is not an affection of the lungs, and does not differ materially from
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the suffocatio stridula, or croup, of the ingenious Dr. Home. However, in forty instances at least of the croup that I have seen, both in this country and in Scotland, the symptoms had little or no similarity to those of the asthma of infants described by Dr. Millar.

In the former, as soon as the person is attacked, the peculiar sound that is heard on inspiration immediately attracts the attention, and points it out as an affection of the upper part of the windpipe. It never has considerable remissions; nor, as far as I can learn, does it ever run into a chronic state*.

In the latter, the case is totally different according to Dr. Millar. Remissions are frequently perceptible, and it constantly

* Vide Home on the Croup. Michaelis de Angina Polyposa. Memoires de la Société R. de Medecin pour l'Année 1782-3, p. 82-3.

changes to a chronic disease; nor do dissections exhibit the same appearances after death. If, notwithstanding these arguments, it still be denied that they are different diseases, this at least must be granted, that Dr. Millar's account of the croup differs very widely from those of the most judicious authors on the subject: so much so indeed, that there is a strong foundation for a charge of inaccuracy and inattention against him: but very few will be disposed to find him guilty of it, who properly consider the many just and faithful observations he has left us on this disease. It was principally on account of the great merit of his work, that I thought it necessary to give the foregoing extracts, with remarks upon them, in order to shew how one of the most intelligent writers on the asthma may be misled by a fond attachment to a favourite theory.

I have been thus insensibly drawn on to
consider

consider at greater length than I originally intended, the causes that give rise to the asthma. From the professed design of this work, I should have confined myself to a few cursory observations only; but the very interesting nature of the enquiry urged me, when once engaged, to extend my subject, and offer to the public such reflections as an attentive consideration of the symptoms and phænomena of this obstinate malady had suggested.

But after all this, it may be asked, how far this theory (admitting it in general well founded) will improve the practice in asthma? Does it recommend any new method of cure? How, or in what manner, is it superior to the doctrines hitherto advanced by medical writers?

If the application of cold to the lungs be in most cases the principal cause of asthma, the impression that such a doctrine must
make

make on the minds of practitioners will be attended with one very important advantage. It will banish from their thoughts the idea of its being an hereditary and incurable disorder, and lead them to consider that it is in most cases accidental, and that of course it will admit of a cure in many instances by proper remedies.

Thus, from the effects that cold usually produces on the human body, evacuations of one kind or other become in most cases necessary, in the first onset of the asthma; and as the disorder is afterwards continued by the power of habit, such means as are found useful in interrupting this, and preventing it from becoming a fixed and permanent affection, should chiefly occupy the attention of the physician. If no other purpose was answered by this view of the asthma, than the consideration of its being brought on accidentally by exposure to cold,

in constitutions apparently the most healthy and vigorous, it may be productive of some advantage.

Except those who have some particular remedy or method of cure to recommend, and who (it may naturally be expected) dwell with peculiar pleasure in praise of their own offspring, which they have fostered and brought to maturity with much assiduity and care, very few besides think a radical cure of a confirmed asthma within the reach of the healing art. Such sentiments as these, when promulgated by physicians of weight and authority in medicine (as is daily the case), must be attended with the worst of consequences; they encourage the old and experienced to content himself with treading in the paths of his predecessors, and deter the young and timid practitioner from venturing to explore any new or untravelled road.

CHAP.

C H A P. IV.

OF THE PROGNOSTICS IN ASTHMA.

WHEN spasmodic diseases, by frequent repetition, have once taken deep root in the constitution, physicians at all times have given a very unfavourable prognosis of them. On the asthma their prognostics have been no less gloomy and inauspicious.

The lungs of the human body, when labouring under spasmodic asthma, are so liable to be affected by a variety of causes capable of renewing the disease, that it is not to be wondered at, if physicians

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should

should be very cautious in pronouncing a favourable termination in any case.

The opinions entertained of the causes of the disease have probably, in a great measure, influenced their decisions. If the asthma be a disorder which is in general transmitted from parents to their offspring by an hereditary taint, or if it originate in an idiosyncrasy, as it is called, or a peculiar state of the fibres stamped on the frame by the hand of Nature; then a physician is justifiable in proclaiming the disorder incurable, and in withholding that consolation from the afflicted, which neither his own character, the nature of the complaint, nor any expectations he can have from the common remedies, will allow him to give. But if, on the other hand, the majority of cases that daily occur in practice be the effects of cold, and cannot be traced to any constitutional infirmity, some
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ray may be emitted from this light to dissipate the mist thrown over the subject, in consequence of the errors committed with respect to the efficient cause of the disease.

That there is in reality no foundation, from its nature, for passing so awful a sentence as is customary with physicians, appears from the many facts and observations brought forward to prove it in the greater number of instances to be an accidental disorder; and until the method of cure be conducted according to these principles, no reliance, in my opinion, can be placed on the prognostics that may be made on the asthma.

If a person, shortly after exposing his body to cold, be attacked with asthma, his disorder will frequently admit of a complete cure, on condition that his lungs have not been previously injured by catarrhal or pleuritic complaints; that no obstructions

exist in the viscera ; and that proper remedies be timely and judiciously employed. Several instances of this sort have occurred to me without any relapse taking place. The more gradual the asthma is in its approaches, the more obstinate it generally turns out. Coming on in this insidious manner, the patient is totally off his guard : he neglects every sort of assistance till a fit comes on, when perhaps the disorder had been undermining the lungs for several weeks before. On such occasions, if the gathering storm be foreseen, it is often in the physician's power to take such steps as may effectually prevent any untoward consequence.

It appears to me, that the obstinacy of the asthma should be often charged to the negligence of practitioners in the early stage of it. A nice and scrupulous attention to this period of the disease, will often guard
against

against the formation of obstructions, and the habitual repetition of the fits, which ever after render it so superior to every medical exertion.

It has been remarked by almost every writer on the asthma, that tubercles are most commonly formed some time before its fatal termination, and that they in a great measure contribute to such an event. When water in the chest, tubercles, and other obstructions come on in consequence of the frequent repetition of the fits, it must be owned that very few, if any instances, are to be met with on record, of a person recovering in such a situation.

But if it appear on accurate examination that none of these disorders exist, though the asthma has continued without any diminution in its violence for a great length of time, and has rather increased as to the number of its fits, the patient still should not

be given up as irrecoverable. No remedy that affords the smallest prospect of relief should be left untried: the cause of humanity, the honour of the profession, demand our most strenuous endeavours; and there is not a doubt but that they will often triumph over the disease in the most alarming and unpromising cases.

C H A P. V.

OBSERVATIONS ON THE DIFFERENT REMEDIES
THAT HAVE BEEN EMPLOYED IN THE CURE
OF ASTHMA.

THE remedies that have been generally made use of in this disease are of great variety, such as bleeding, blistering, issues, expectorants, antispasmodic tonics, &c. A minute detail of each would lead to a long and tedious discussion, not by any means calculated for an Essay of this kind. Some observations however appear necessary; and these are offered to the public with the greatest diffidence, from the state of uncertainty in which the practice of asthma is involved.

On the first attack of the asthma, blood-

letting is often looked upon to be a very useful remedy; and it really, is so, when the patient's fulness of habit, the strength and quickness of his pulse, with other circumstances, point out the necessity of such an evacuation. But in many instances of the first onset of asthma, blood-letting cannot with any propriety be attempted; for the disorder sometimes attacks feeble and exhausted constitutions, which may be materially injured by any loss of blood whatsoever.

One great advantage, if not the principal one, supposed by physicians to be obtained by bleeding in the asthma, is the temporary suspension of the difficult breathing that generally succeeds its use. If no other purpose was answered by it than this, it would be of very little moment, as a renewal of the paroxysms most commonly succeeds this transitory interval of ease.

In order to form a just idea of the utility of bleeding in asthma, we must look back to the causes that first gave rise to the disease. From this retrospect it will appear, that the application of cold to the lungs is the most frequent exciting cause; and that, in consequence thereof, very strong symptoms of an inflammatory disposition must often accompany the first stage of asthma.

Hence it is that, in many cases, a physician must necessarily prescribe venesection in order to preserve the life of his patient, and not confine his views merely to the removal of a plethoric state, or to the abatement of spasm by the relaxing power of blood-letting. On other occasions too, though no danger to the patient's life should follow the omission of this practice, it will be highly proper to have some blood drawn in order to obviate obstructions, and bring about a state of intermission, so necessary
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for the operation of such remedies as are capable of putting a complete stop to the further progress of the disease.

Blistering, from its well known power of exciting a copious discharge of serous fluid, seems eminently well calculated for removing some of the most distressing symptoms of asthma. However, some practitioners of character have ventured to assert, that in the spasmodic asthma blisters are productive of little or no advantage. This is maintained on a principle that the disorder is seated in the nervous system; and never was there a more striking instance of the baneful influence of theory unsupported by facts. Cases no doubt will occur, in which blisters will often fail in producing those salutary effects that were expected; but the signal success daily attending their use, proclaim them on many occasions a speedy-

speedy and powerful auxiliary in the cure of this disorder.

Whenever the fits are renewed by the power of habit, blisters will seldom avail any thing in overcoming this tendency in the system. It is in the beginning of the disorder, or when a fit is brought on by the application of cold at any period, that benefit is to be obtained by them.

I always make it a rule to apply a blister in the first paroxysm of asthma, be the cause of the disorder what it may ; and as no injury can attend it, but very often the best effects may be produced, the propriety of the measure is evident.

Blisters appear to be well adapted to that species of asthma where an accumulation of blood in the lungs is found to contribute in some measure to the fit, and where, of course, a plentiful evacuation near the diseased part would be a probable means of
removing

removing it. In every primary asthmatic complaint, whether the patient be of a full habit or otherwise, if, in the beginning of the disease, the intermissions be not complete, or if the breathing be any way uneasy between the fits, blisters are not only admissible, but should on no account whatsoever be omitted.

It should be a principal object with practitioners, as we noticed before, to bring about if possible complete intermissions early in the disorder. Sometimes there will be no need of this indication, as the intermissions are often well marked from the beginning; but in the greater number of cases there is an absolute necessity for it. It is deemed a matter of no consequence to what part of the thorax the blister should be applied; nor is it, I believe, for the removal of the symptoms of difficult breathing or tendency to inflammation. But
when

when the asthmatic fit passes off, any difficulty or uneasiness of breathing that remains, is in a great measure supported by the stricture at the sternum. To this part, of course, it is evident that the blister should be applied, and a discharge kept up by issue ointment, or else a repetition of the blister made use of, until the desired effect be produced.

I do not rest the superior utility of this practice on the reasoning advanced in support of it: facts, which always plead so forcibly when well authenticated, can be readily called to my assistance. Thus, in two instances, I had an opportunity of seeing a blister at the extremity of the sternum productive of singular success, both in removing the stricture at this part, and in abating the whole of the symptoms, after little or no benefit was obtained by its application between the shoulders. By pursuing the
plan

plan now laid down, we shall have it in our power to remove any symptoms of inflammation that may subsist, and shall seldom want of course a seasonable opportunity of administering the necessary remedies for putting a final stop to the disease.

Dr. Millar has made an observation on the asthma, that, in my opinion, is very well founded. He says, that in the irregular return of its paroxysms, in its remissions, and in the affection of the breathing, it bears a striking analogy to the chin-cough. This disorder, though evidently of a spasmodic nature, often requires bleeding, blistering, and emetics, before we can venture upon a radical cure. During its first stage, it so nearly resembles a common catarrh, that the one may be readily mistaken for the other: nay, instances do very frequently occur, in which the disease never
puts

puts on the characteristic form of a spasmodic disease.

This matter is well illustrated, by attending to a fact that must be well known to practitioners. If a number of children in a family be exposed to the contagion of chin-cough, and in consequence thereof happen to be attacked with symptoms of catarrh, it is often found, that while one or two of them discover no further symptoms of chin-cough, all the rest, in a fortnight or three weeks after the first appearance, will labour under the convulsive cough and hoop. Moreover, after the paroxysms are formed, the intervals between are often marked by cough, difficult breathing, and other symptoms of an inflammatory affection; so much so as to render it at times a difficult matter to affix a proper appellation to the disease. Hence we must frequently have recourse to bleeding, blistering, and other evacuations,
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in order to remove any inflammatory disposition that may exist, and put the disorder in a proper train for the administration of tonic and other remedies. Motives of a similar nature should often influence our conduct in directing the method of cure in asthma; for though in many instances it early assumes the form of a genuine periodical spasmodic disease, yet, like the chin-cough, it will be constantly found in the beginning of a doubtful nature, and, after the fits have come on, to be accompanied with strong marks of an inflammatory tendency.

While it is in this state of a mixed and complicated disease, little hopes can be entertained of a cure; but if blistering, with other evacuations, so far succeed as to render the breathing free and unembarrassed in the intervals of the fits, and exhibit the asthma stripped of every sort of disguise, then

then, there will be room to hope for a favourable termination.

Emetics.—Very frequently in the asthma the lungs are oppressed with a large collection of phlegm, from which it is found necessary to free the patient by medicines entitled expectorants. Accordingly physicians, to fulfil this intention, have generally prescribed tart. emetic, squills, gum ammoniac, and others of this tribe. From the testimony of different writers, it would be scepticism to deny that these medicines have been of service in the asthma. But, on the other hand, it is to be feared that the constant use of such drugs may prove injurious to asthmatics; for they not only increase the force of the circulation, and thereby overheat the body, but in a remarkable degree impair the functions of the stomach by the constant nausea they

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induce,

induce, if given in quantity sufficient for producing any considerable effects as expectorants.

Hence, when we wish to promote expectoration, an emetic judiciously administered at proper intervals, will certainly prove the most safe, speedy, and effectual remedy.

Even in those cases of asthma where no necessity occurs of employing expectorants, vomiting, it is said, may be resorted to with advantage, for the purpose of preventing the recurrence of the asthmatic fits. This was the practice of Dr. Akenfide : and, on his recommendation, I employed it in three or four cases with the same intention that he did, and always found myself disappointed in my expectations.

Besides its efficacy as an expectorant, and its effects in removing any catarrhal affection that may be combined with the asthma,

vomiting

vomiting will be found highly useful in relieving the patient of flatulence, distension of the stomach, and other symptoms of indigestion.

In prescribing for asthmatics, it may with justice be observed, that the more closely we adhere to simplicity, the better chance we stand of assisting them. How is it possible that the feeble and distended stomach of an asthmatic can bear with impunity such a compound as the following: Suppose squills, gum ammoniac, sagapenum, emetic tartar, paretoric elixir, and vitriolic æther, made into a mixture *secundum artem*, and a delicate asthmatic ordered to take it repeatedly, what ought we naturally to expect to be the result? That whatever vigour the stomach possessed before, will now be destroyed by so many medicines of such various and contradictory operation. It is surely more than rashness to overload a

feeble and enervated stomach with such a nauseating farrago: yet we find practitioners prescribe similar potions in the asthma, and eagerly contend for their efficacy.

If it be considered for a moment with what difficulty their stomachs digest the lightest kind of aliment that can be given to them, we should, I am persuaded, be very cautious in administering such compounds; for though one or two patients may be able to withstand their operation, or should even receive some benefit by them, still an indiscriminate use of such heterogeneous mixtures must prove in many cases very prejudicial.

I would not by any means insinuate that the use of medicines, even a variety of them, is to be excluded from the cure of asthma, as they are sometimes absolutely necessary: but I maintain, that if simplicity

of prescription be commendable in any disorder, it must be so in this; where the stomach at times is so deranged in its functions, as to partake at length in a great measure of the primary spasmodic complaint of the lungs.

Issues have been often employed in the cure of asthma, and I think with much propriety. The idea of a convulsive and spasmodic disease should not deter practitioners from their use, when certain indications point out a probability of success from their application.

There are two varieties of the disease that seem particularly to demand their assistance.

The first and most striking one is, when the disorder occurs in persons of full and plethoric habits. The next is, when the patient, with or without any signs of general fulness, together with the asthma

labours under a catarrhal affection. In either case the utility of a drain is evident, in order to take off the tendency of the fluids from the internal, and give them a direction to the external parts. If, however, the disorder should still gain ground, and the body appear to have suffered any considerable loss by such, it may not be prudent in such cases to keep up a constant discharge, as it might be a means of promoting a process already too far advanced. Issues should be immediately inserted between the scapulæ, or in each arm, whenever any symptoms of consumption of the lungs take place: even before they come on, if any apprehension exists of such an event, no remedy promises to be more useful than issues.

After this account of the evacuations necessary to be employed in the asthma, we are next to consider what medicines we are possessed

possessed of capable of alleviating or suspending the fits.

For this purpose, various remedies have been recommended by different writers, and much contrariety of opinion has prevailed on the subject. According to Dr. Willis, the foetid gums and volatile salts have sometimes produced the happiest effects : while Sir John Floyer*, from long experience in his own person and that of others, reprobates their use ; and asserts, that by their heating quality they increase the suffocation during the fit, and aggravate every prevailing symptom. The writers of modern times do not appear more disposed to coincide.

On this subject I cannot venture to give so decisive and satisfactory an opinion as I could wish, not having had experience suf-

* Floyer on the Asthma, p. 112.

ficient to authorize me to do so; for when medicines of this kind were indicated, I seldom had an opportunity of giving them, and in other cases I had recourse to those of a more unequivocal and powerful operation.

However, from what I have seen, I do not think them entitled to the high encomiums of the one, nor that they deserve the severe and undistinguishing censure of the other.

When in the beginning of asthma the fits recur at very short intervals, after evacuations being premised, and that symptoms are still present which forbid the use of opium (as must sometimes be the case), will a physician look on with indifference, and behold the disorder advance with rapid strides, without taking such steps as may oppose its progress? No. I dare say that every physician of judgment, in such a situation,

ation, would prescribe musk, æther, and asafœtida itself in large doses, in order to lengthen the intervals of the fits, and give himself an opportunity of throwing in the bark and other tonics with freedom.

In the hands of Dr. Millar, asafœtida, when given in large doses, proved a very powerful remedy in the asthma of infants; and it is highly probable that, on many occasions, with proper management, it may be administered in the asthma of adults with advantage. It was customary with him to join a portion of neutral salt with the asafœtida in a state of solution, for the purpose I suppose of procuring a moist skin, having found by experience that it was often succeeded by a complete remission of all the symptoms.

As cold is so frequently the exciting cause of asthma, we are warranted from analogy to say, that spiritus Mindereri, and other
 medicines

medicines capable of procuring a gentle moisture at the surface, may with propriety be given in the early stage of the asthma; and that of course the practice of Dr. Millar may be sometimes transferred to grown up persons, and imitated with success *. Of this, however, I have had no experience.

Among the various medicines of this class, opium unquestionably, with certain restrictions, holds the first rank. Ever since its introduction into the cure of asthma, some of the most celebrated writers on the disease have considered it peculiarly well adapted to the removal of the spasmodic fits. Willis, Floyer, and others have

* In one case of the hysteric asthma of Sir John Floyer, I have seen asafoetida produce more good effect than any other medicine of analogous power. When other antispasmodics failed in procuring relief, a large dose of this operated with singular efficacy in abating the spasms of the lungs.

given it with freedom, and it has frequently answered their most sanguine expectations. Willis in particular seems to have made some just observations on its use; for though he speaks in high terms of its efficacy, yet he qualifies them in such a manner as to guard against its rash or indiscriminate application.

Quod si hoc modo spiritus debacchantes sedari nequeunt (alluding to the other means that he used), ad narcotica (says he) perveniatur, ut quibusdam profligatis cæteri in ordinem redeant: enimvero, nisi obstat pulmonum infarctus, cum insigni præcordiorum oppressione, opiata nonnunquam insigniter profunt. In horrendis morbi hujus paroxysmis, cum alia medicamina minus effecissent, sæpe bono cum fructu diacodium, imo laudanum tartarifatum, exhibui.

Verum hæc non sine magna cautione propinantur, quia cum respirationem, quæ
jam

jam jam difficilis et præpedita est, amplius et nimis impediunt, non raro in vitæ discrimen adducunt.

Willis, Oper. Omn. à Blasio, p. 121,
De Medic. Operatione.

A physician should be very cautious how he administers opiates to a patient in the first paroxysm of asthma: he can seldom be a competent judge of its nature till the fit wears off, and an opportunity offers of examining its appearance during the intermissions. This admonition is the more necessary, as the disorder, in its incipient state, is so frequently accompanied with a flow of humours to the internal parts, and evident symptoms of an inflammatory tendency.

But as soon as these obstacles are removed, no time should be lost in deliberation; a large dose of the medicine is to be given without delay, in order to put a stop to the fits, and thereby counteract that disposition

position in the system to renew any irregular motions that have once taken place.

If any instruction coming from this pen can have weight with practitioners, I would beg leave to direct their attention in the most particular manner to the early stage of asthma; for I can safely aver, from experience, that a bold and liberal administration of opium at this early period (when circumstances render it admissible) will often put the disorder in such a train, that no extraordinary degree of medical talents or skill will be requisite for finishing the cure.

In one case of symptomatic asthma from retrocedent gout, it proved a speedy and effectual remedy; and in three or four instances of a primary disease, the tendency in the habit to repeat the fits was so far subdued, that no difficulty was found in obtaining a complete and lasting cure.

The opium possesses the power of shortening

ening or removing the fits altogether ; yet a good deal of address is necessary for selecting those cases to which it should be confined, and for adjusting the mode and time of giving it. If the disorder has subsisted for any length of time, and that the fits return every night, or at short intervals, in consequence of the ascendancy of habit, opium, according to my observations, will seldom answer our purpose. In some instances I have rather found it prejudicial, by rendering the succeeding fits more violent, and of longer duration than the preceding. It would seem as if the effects of opium in these cases were too transitory to produce any permanent alteration in the state of the fibre, and that the habit was too firmly rooted to give way to an operation so fugacious as this.

Hence there is an absolute necessity, on such occasions, of having recourse to medicines

cines whose effects are more durable; and the time should not be trifled away in giving opium, or any other remedy of a similar nature.

It is in the early stage of the disease, or even in an advanced period thereof, if the fit be brought on by accidental causes, that we are to place any reliance upon opium; and in order that its full force and efficacy should be displayed, a large dose of the medicine must be given immediately before the accession of a fit; or, if this cannot be accomplished, as soon as any threatenings of it are perceptible. By this management we shall often succeed in postponing the fit, and in laying the foundation of another piece of necessary practice, the use of tonic remedies.

It appears by the records of physic, that those medicines which now-a-days are denominated tonic, were at all times prescribed

scribed for asthmatics under one form or other. The bitter acid, so much celebrated by Sir John Floyer, and which he borrowed from the ancients, was unquestionably of this nature. Modern practitioners however are very limited in their choice of remedies belonging to this class: their practice is chiefly confined to Peruvian bark, and a few others of considerable powers. Even these are seldom extensively employed in the cure of asthma. Sir John Floyer, who probably first introduced the bark, at least who first brought it into any general repute, restrained its use to the hysteric and other forms of nervous asthma, in which the fits return at certain stated periods. But terms of such vague and doubtful signification scarcely deserve to be mentioned in these days; and still it is surprising to find physicians adopt them, and direct their practice accordingly.

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In the first stage of asthma, no spitting in general takes place till the patient has had repeated attacks of his disorder ; so that, from its commencement to the time that this symptom supervenes, every asthmatic complaint, let the habit of body be what it may, should be denominated nervous, according to the usual definitions. But as soon as any copious expectoration comes on, this circumstance alone is supposed to change its nature, and to constitute a different species.

It is true, indeed, that the recurrence of the fit at a certain hour gives it the appearance of a genuine nervous affection : nevertheless it should be considered, that this tendency in the disorder to return periodically, is to be found in every variety and form of asthma, in the spitting kind as well as in that which is accompanied with no such symptom.

In Sir John Floyer it assumed this type at an advanced period of life, though he was first attacked with his asthma in consequence of a cold that he got when very young. In fact, it is the case with many asthmatics from the effects of habit on the system; and I have often known the disorder shortly after its commencement appear in a periodical shape, when it could be evidently traced to the operation of cold.

Many different symptoms accompany the asthma during its course, that may in some measure change its type, though it would be absurd to establish a distinct species on the basis of every instance of this sort. Should this principle be admitted, there would be no end to the multiplication of species. The genuine asthma is, for the most part, the same in all, but differently modified according to various circumstances and causes.

One asthmatic discharges a considerable
quantity

quantity of phlegm by coughing, and this is called the humoural or spitting asthma; another is troubled with flatulence, and his is termed the flatulent or hystERIC asthma; a third person's goes under the appellation of plethoric, if he be of a full habit; and so on without end.

Hence it is evident that these distinctions, instead of leading to any useful or important discrimination in practice (as might naturally be expected), have been converted to a very bad purpose, by excluding bark from every species of asthma that could not be considered strictly nervous.

The principal symptoms that contraindicate the use of bark in the early stage of asthma, and to which physicians should particularly direct their attention, are, inflammation or tendency to it, a full habit of body, and catarrhal affections. All these very frequently take place at the same time;

and whether they occur conjointly or separately, it would be more than rashness to administer the bark during their existence. But as soon as these obstacles are removed by general and topical evacuations, and that no difficulty of breathing remains after the fit has passed off, there are very few cases that will not admit of the bark, particularly if the repetition of the fits be owing to the dominion of the power of habit over the system.

The effects of the power of habit in renewing the disease after the primary causes have ceased to exist, have been already spoken of; and in this place it may not be uninteresting to recall the attention to it: Whoever has watched the progress of the asthma with assiduity, must have remarked that the power of habit operates with the same intensity in this as in other spasmodic diseases; that, if once allowed to take root
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and extend its influence, all the force of the best directed practice will not be able to overcome the opposition to be met with. This is fully proved by the concurring testimony of practitioners. Hence it is obvious how necessary it becomes to watch with anxious care the beginning of the disorder, and oppose with vigour and dispatch a state so dangerous in its tendency, so irresistible when once confirmed, as to bid defiance to the united endeavours of experience and judgment.

That the bark may break in upon this habit, and put a stop to its further operation, we have reason to believe, both from the cure of other spasmodic diseases, and from experience in the asthma itself. Our success, it is true, in the latter has not generally answered our expectations; and this should probably be attributed in some measure to a negligence on our part to that pe-

riod of the disease wherein tonic remedies can act with efficacy.

The cure of asthma, by means of the bark, should be conducted in the same manner as in the case of intermittent fevers. The doses of the medicine should be very large, and ought to be given within a few hours of the accession of the paroxysm, if we can foresee the time when the attack is to come on.

With respect to the administration of bark in the humoural asthma, as it is called, it is to be observed, that when the spitting is the consequence of a recent cold, it is very rarely admissible: the tendency to inflammation, and such like complaints of the chest that generally accompany this affection, proclaim the bark an expedient of a very precarious nature. But as soon as the disorder of the lungs is subdued, though the spitting should still continue, both reason
and

and experience fully justify a trial of this truly celebrated medicine.

Cases however will often be met with, in which some stuffing of the chest takes place from cold in the intervals of the fits, with scarcely any increase of the preceding difficult breathing, if any had subsisted, or any symptom of inflammation; and yet it would be injudicious and improper to administer the bark during its prevalence.

Calcined zinc, commonly known by the name of flowers of zinc, next demands our attention. To the industry and abilities of Dr. Withers we are indebted for this discovery. From his experiments, it appears that he employed the flowers of zinc in almost every form of asthma, and with astonishing success. Since his publication in 1786, I have not heard of any further testimony in its favour: for I do not know any practitioner that has followed his very

laudable example, in instituting a regular set of experiments for this purpose.

In several instances it has been administered, to my knowledge, in pretty large doses, and with evident advantage; while in other trials its efficacy could not be discerned, though given agreeably to the instructions delivered by Dr. Withers himself.

Without any intention to deduct from the authenticity of those cases recorded by Dr. Withers, it is to be hoped that practitioners of abilities, who have frequent opportunities, will imitate his conduct, in order to appreciate the virtues of this medicine, and ascertain how far it may be relied upon in the multifarious cases of this obstinate disorder that daily present themselves in practice.

Like the bark, it will probably be found most effectual when given in the intervals of the paroxysms, in as large a dose as the stomach

stomach is able to bear; and when no obstruction, difficult breathing, or inflammation, exists to counteract its operation. Yet Dr. Withers asserts that, together with its tonic, it possesses an antispasmodic power; and says, that he found it beneficial in removing the difficulty of breathing, as well as in preventing the return of the fits. Something similar to this has been remarked of the Peruvian bark. A case is related by Sir John Floyer, of a Lady* afflicted with the asthma, who, on taking a dram of bark, found her breathing immediately relieved; and, by persevering in its use, she got rid of her disorder for a considerable length of time.

These facts plead very forcibly in favour of a free and undaunted application of such medicines in cases of an apparently equivo-

* Floyer on the Asthma, p. 20.

cal nature: they in particular shew us that we are not to be deterred from prescribing them on certain occasions, though the breathing should not be perfectly free in the remissions,

When water in the chest, tubercles, and other organic affections are complicated with the asthma, it is evident that neither these nor any other kind of tonic can be given with safety or advantage.

Such are the observations that have occurred to me on the different remedies usually employed by physicians in the cure of asthma. Other means besides, such as mercury, mineral waters, &c. have been recommended by particular writers; but I purposely omit their discussion in this place, not having it in my power to advance any thing from experience concerning them that would prove useful or satisfactory. For instruction on these subjects, I must refer my readers to
those

those authors who have had proper opportunities of being well informed of their efficacy and powers. I also avoid entering into any consideration of the regimen and diet fit for asthmatics, as this subject is treated with great judgment by Sir John Floyer, Dr. Withers, and other ingenious physicians.

On a retrospective view of the various remedies treated of in the foregoing pages, a question very naturally presents itself—Is the cure of a confirmed asthma to be expected from a judicious management of them? If we be governed in our decisions on this point by the experiments of Sir John Floyer, we should answer without hesitation, that a complete cure cannot be effected by them, or in conjunction with the other auxiliaries in common use.

Sir John Floyer's Treatise on the Asthma (as far as I can learn) has been erected not

only as a standard for the practice, but for the doctrine of prognostics also.

The respectability of his medical character, his minute and very accurate description of the disease, his course of experiments instituted on his own person, carry a degree of plausibility with them that is not a little imposing. Neither his candour or fidelity in relating the effects of the numberless remedies he tried, can be called in question ; yet it must be acknowledged that the result of his experiments has infused such a large portion of scepticism and incredulity into the minds of physicians, as must have repressed their ardour for improvement, and lulled them into an acquiescence in the futility of almost every kind of medicine in the asthma.

It would be as unphilosophical to deduce any conclusion from Sir John's experiments, derogatory to the power of medicine,

cine, as it would from similar trials made on a person labouring under the epilepsy for the same number of years that he laboured under the asthma.

According to Sir John's own account of himself, he was attacked with the asthma when he first went to school, which must have been at a very early period of life ; and by the time that he arrived at an age fit for making experiments, his disorder was so firmly fixed in the constitution, that it was no longer in the power of medicine or regimen to remove it.

When a disorder, particularly a spasmodic one, has subsisted for a number of years, it is not reasonable to expect that the action of medicine will produce any signal or extraordinary benefit : to an early period, if at all, we must look for satisfactory and striking proofs of their efficacy ; and if the medicines we are possessed of be tried by this
test,

test, their effects will not be found so despicable as several have imagined. On many occasions, when properly managed, they will put a stop to the progress of the disease ; and if the occasional causes be afterwards avoided, a radical cure may often with certainty be obtained. This event, however, will not take place as often as could be wished, in such a variable climate as this, without further assistance. We shall frequently meet with disappointment in our expectations of the most powerful medicines, though given in circumstances highly favourable to their operation ; and should we even succeed in subduing the disease for a time, yet all the circumspection in our power will not in general be able to guard against a relapse.

To make up for this deficiency, and, on the whole, to establish the cure of this disease on a firm basis, cold-bathing must be
called

called to our assistance. In truth, its efficacy has appeared to me so striking in many cases, both in removing the fits and in preventing a relapse, that, if the instructions contained in the succeeding part of this work be properly attended to, I do not hesitate to declare, that very few spasmodic disorders, of such magnitude as the asthma, will be found so completely within the reach of our art.

8/15

2

John Brown

1840

C H A P. VI.

OF COLD-BATHING.

OF all the remedies that physicians are acquainted with, there is probably not one held in more universal esteem for the cure of many diseases than cold-bathing. In the long catalogue of chronic complaints, particularly in the nervous and spasmodic, experience has stamped a value on it superior to that of any medicine yet discovered. In the asthma, however, this practice has been rarely recommended, as will fully appear from what is to be met with on the subject in the writings of physicians.

We find but one of all the ancient

writers who recommends cold-bathing in the asthma.

Cælius Aurelianus says, that residing at the sea-coast, and bathing in the water, are highly useful to asthmatics; though he produces no instance of its success to support his assertion.

The next authority that we have is Sir John Floyer, who gives some proofs of its utility, in his *Treatise on Cold-Bathing*.

“ I have (says he) discoursed with an
 “ asthmatic person, who has had an habitual
 “ asthma for many years, and she informed
 “ me, that she went into St. Winifred’s Well
 “ a Holywell, and that her asthmatic dry
 “ cough went off for some time, but at last
 “ returned again.”

Treatise on Cold-Bathing, p. 121.

“ I have had several accounts of people
 “ being much relieved, and some perfectly
 “ cured by the use of cold immersion, in
 “ asthmas,

“asthmas, and other difficulties of breathing,
 “especially if the infirmity is taken in the
 “beginning, and not confirmed by time :
 “yet an old gentleman, of sixty years,
 “lately told me that, having had a convul-
 “sive asthma for at least seven years, he was
 “so cured by three times bathing, that he
 “had not the least fit for three months after ;
 “and believes that, had he lived tempe-
 “rate, and continued bathing sometimes, it
 “would not have returned.”

Ibid. p. 314.

Dr. Millar, in enumerating the different
 authorities in support of cold-bathing, tran-
 scribes a passage from Dr. Baynard's Essay
 on this subject : but as this quotation agrees
 word for word with the preceding one from
 Sir John Floyer, I think it unnecessary to
 insert it here.

I have not the work of Dr. Baynard at
 present in my possession, but I imagine that

he took this passage from Sir John's work, and that Dr. Millar was mistaken in supposing that it originated with Dr. Baynard himself.

If this be not the case, I cannot account for so extraordinary an instance of two writers exactly corresponding in their ideas and language on such a subject as this.

The only writer that remains to be considered is Dr. Smollet; who gives a circumstantial account of the effects of cold-bathing on his own person.

“ In consequence of a cold caught in a
 “ few days after my arrival in France, I was
 “ seized with a violent cough, attended with
 “ a fever and stitches in my breast, which
 “ tormented me all night long without
 “ ceasing. At the same time I had a great
 “ discharge by expectoration, and such a
 “ dejection of spirits as I never felt before.
 “ In this situation, I took a step which may
 “ appear

“ appear to have been desperate. I knew
 “ there was no imposthume in my lungs,
 “ and I supposed the stitches were spasmo-
 “ dical. I was sensible that all my com-
 “ plaints were originally derived from re-
 “ laxation. I therefore hired a chaise, and
 “ going to the beach, about a league from
 “ the town, plunged into the sea without
 “ hesitation. By this desperate remedy I
 “ got a fresh cold in my head : but my
 “ stitches and fever vanished the very first
 “ day, and, by a daily repetition of the bath,
 “ I have diminished my cough, strengthened
 “ my body, and recovered my spirits.”

Smollet's Travels, vol. i. p. 22.

Dr. Smollet also mentions, in another part of his work, that he had two returns of his disorder, and that at each time he subdued it by sea-bathing.

His agitated furiis, æger ad mare provolat:
 in fluctus se præcipitem dat: periculum

factum spem non fefellit: decies iteratum felix faustumque evasit. Elater novus fibris conciliatur—febricula fugatur—aëris dyspnœa solvitur.

Ibid. p. 179.

Desperatis denique rebus iterum ad mare veluti ad anceps remedium recurritur. Balneum hoc semper benignum. Dolor statim avolat. Tertio die febris retrocessit. Immerfio quotidiana antemeridiana ad vices quinquaginta repetita symptomata graviora subjugavit.

Ibid. p. 180.

These then are the principal, if not the only facts that the records of physic afford in favour of cold-bathing in asthma; and, before we proceed any farther, a few observations on each shall particularly engage our attention.

From what is to be found in the writings of Cælius Aurelianus relative to this practice, very few, I suppose, would be fond of
adopting

adopting it. The bare ipse dixit of an author, let his reputation be what it may, will seldom induce practitioners to prescribe any remedy of a precarious nature; they must have something besides conjecture to recommend it to their notice.

No such charge, however, can be brought against Sir John Floyer, as he appeals to the test of experiment for what he has advanced, and gives a satisfactory account of the effects of the water on some asthmatic patients.

But, did Sir John, in consequence of the information he had on the subject, consider cold-bathing a remedy well adapted to the cure of asthma?

He laboured under the asthma, according to his own acknowledgement, for the greater part of his life, without obstructions in his lungs, or any other disorder in which cold-bathing would be prejudicial; and still

we

we do not find that he had courage enough to make use of this remedy.

Moreover, he does not inform us, in any part of his Treatise on Cold-Bathing, that he tried it on his patients, or even recommended it to them; and when he comes to give his own opinion, he delivers it in such an equivocal manner, as to leave very little doubt on the minds of his readers, that he placed no great confidence in it, and that he was not well qualified to decide on its virtues.

“ I cannot believe (says he) that cold-bathing can help any defluxions, such as the asthma, without water drinking, and in a recent disease.”

Treatise on Cold-Bathing, p. 20.

That the internal use of cold water should assist its external application in the asthma, is an assertion of so extraordinary a nature, that very few will be disposed to attend to it ;

it; and I am convinced that, if Sir John Floyer had experience for his guide in this matter, he never would have been led into this mistake, nor have broached so erroneous a doctrine.

The case of an asthmatic patient will be related hereafter, who, during a course of sea-bathing, drank at least a bottle of wine every day, and sometimes exceeded this quantity without any injury. In fact, I never gave any particular directions on this head, except in the present case, and wine was found absolutely necessary from the low and debilitated state of the patient: all the rest were allowed to drink whatever agreed best with them, and the cure went on as well as if the most scrupulous attention had been paid to this point. There is one circumstance that seems to have led Sir John into this mistake. He in general found that water agreed better with his asthmatic patients

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patients than any other liquid ; and, from this principle, he was probably led to believe that cold-bathing would prove injurious, unless the patients restrained themselves to the drinking of water during the cure.

The only remaining fact to be considered is that related by Dr. Smollet, concerning his own person.

In his case, cold-bathing was attended with the most extraordinary success, notwithstanding there were many circumstances which seemed to point it out as a desperate expedient. He says, that he was induced to try it, from an idea he had of his disorder originating in relaxation.

It may look like presumption in me to differ in opinion with a man of no inconsiderable knowledge in medicine about the cause of his disorder, and one who, it is to be supposed, was well acquainted with the

causes that contributed to his valetudinary state; but whatever had been his previous constitutional infirmity, the asthmatical attack in question was evidently the effect of cold, had no connexion with relaxation or debility, and of course did not warrant so rash and immediate a use of cold-bathing.

The suddenness of the attack, attended with fever, stitches, and expectoration, proclaim a strong tendency to inflammation in his disorder, and should have deterred him from trying so hazardous an experiment until the violence of the symptoms had in a great measure abated. By his own confession he got a fresh cold in his head, which he probably would have escaped, had he waited for a few days till the feverish state of his disorder passed off; and it is astonishing to find that nothing more serious befel him in such a situation. But he was not to be dismayed: he persevered in his resolution,

lution, and had unheard-of success. A second and a third time he had recourse to this remedy, and with no less impunity than at first.

Physicians, however, should be very cautious how they consider the fortunate issue of this case, an example worthy of imitation.

In every recent attack from cold, or indeed from any other cause, it would be highly imprudent to precipitate a person into a cold bath, without farther ceremony, though no inflammatory symptoms were present at the time. But how much more rash and unguarded must it be, to direct cold-bathing for an asthmatic labouring under fever, stitches, and difficult breathing, which indicate at least a strong tendency to inflammation in the lungs!

To illustrate this, I will give a case.

There was a gentleman under my care
very

very lately, who, from cold-bathing, was fortunate enough to get rid of his asthmatic fits, in a great measure, after every other method had failed: but by unguardedly exposing himself to cold air, he unluckily got a relapse. Not dreading, however, any bad consequence from a remedy that had hitherto served him so essentially, he continued to bathe every day, until an affection of the lungs, bordering on a peripneumony, obliged him to desist.

This shews us very clearly what risque a person in Dr. Smollet's situation must run from cold-bathing, and accordingly we do not find that his success has excited any ardent desire in the breasts of other practitioners to follow his example: indeed there is so much of the marvellous in his case, that one may naturally suppose it would rather suppress than promote such a disposition in people of prudence and reflexion.

On

On the whole, it is evident that the facts and observations to be found in medical authors relative to cold-bathing in the asthma, are few, unsatisfactory, and deficient. That they have had no weight with practitioners, is fully evinced by the medical writings of modern times.

In all the late publications on the asthma, cold-bathing is not even mentioned as a remedy, except in one work *, and that too in a transient manner: no new facts are brought forward, to give additional credit and stability to this practice: the author implicitly relies on the authority of Dr. Millar, and he (as we have already seen) resorts to the doubtful evidence of Sir John Floyer and Dr. Smollet, without any experience of his own to corroborate the testimony of either.

The practice of physicians, according to

* Withers on the Asthma, p. 114.

my information, is perfectly conformable to their writings. If bleeding, blistering, and the rest of the common and well-known remedies happen not to succeed, they give up the ill-fated victim to patience and an incurable disorder.

It is not to be wondered at, that the cases related by Dr. Millar should have been passed by unnoticed by physicians. A few solitary facts, though unexceptionable as to their authenticity, when founded on experiments of an apparently dangerous nature, and delivered without any attempt to form a system of principles, will seldom flash conviction on the minds of people that are accustomed to hear facts published with confidence by one physician to-day, and contradicted by another with the same certainty the next.

These, with other considerations, have induced me to institute the following expe-

L riments,

riments, in order to decide on the propriety of cold-bathing in the asthma; and, I suppose, the very lame and imperfect account of it to be found in the works of physicians, will fully justify the undertaking. To guard against any objection that may be made to the facts I want to establish, I took down a particular state of each case at the time the patient was committed to my care, and obtained a precise and satisfactory account of the operation of the water, either during the progress of the cure, or, if this could not be had, immediately after it was fully completed.

In short, from the situation of the different patients before recourse was had to cold-bathing, from the inefficacy of the other remedies employed, and from the manner in which the experiments were conducted, I expect it will appear that no fallacy can be discovered in the inferences drawn from them,

them, nor any room left for cavil or contradiction on this subject. In many cases besides the following, I have known cold-bathing prove highly salutary: but as I was not exact in committing to paper the history and cure of such patients, I cannot think of offering any fact from memory alone, but shall confine myself to a more faithful and authentic record.

C A S E I.

THE first instance of the good effects of cold-bathing in asthma that happened to come within my knowledge, was that of a woman, about twenty-five years of age, who had borne several children. From her first pregnancy onwards, she was subject to spasmodic complaints of the stomach and bowels, both during the periods of gestation, and the intervals thereof; without the smallest

tendency, however, to any disorder of the lungs. But on exposing herself to cold shortly after a lying-in, she began to feel an uneasiness in her breathing, attended with a short teasing cough, which, in a few days, terminated in a confirmed spasmodic asthma. In no case whatsoever were the pathognomonic symptoms of idiopathic asthma better marked than in the present: the fits returned most commonly late in the evenings, preceded by flatulence, continued through the night, and ended towards morning with a free and plentiful expectoration. In fact, all those symptoms were present that usually characterise the most violent and alarming state of this disease.

Blisters, asafoetida, camphor, and the rest of the usual remedies in those cases were tried; but all to no purpose, for the fits still returned every night with very little abatement of their violence. At length recourse

course was had to cold-bathing, and the success that attended its use far exceeded any expectations that were formed of it. In less than a week from the first immersion, the patient found herself very sensibly relieved; and by continuing the practice for the space of six weeks, she obtained a complete and lasting recovery.

If a single fact can authorize a particular mode of treatment in any disease, we are certainly warranted in recommending the cold bath in asthma from the precedent before us, especially as the utmost precaution was taken to guard against any deception about it. I was altogether so exact, that I even intermitted the bath for a few days, after some change for the better had taken place, in order to satisfy myself of its efficacy: but the patient began to relapse so suddenly into her former situation, that

an immediate repetition of the bath was found absolutely necessary.

Hence we see that very little room is left for supposing that nature was in any degree entitled to the merit of this recovery; and this will be the more readily acceded to, if people consider how feeble and deficient her endeavours must be, when engaged in combat with such a formidable adversary as the asthma.

River water was the bath made use of on this occasion, from its vicinity to the patient's habitation, and as a preparatory step to bathing in the sea; but as the former answered every purpose that could be expected, the latter was neglected, and the cure went on equally well without its assistance. This, however, is the only instance in which I have seen a cure obtained without sea-bathing; its powerful stimulus being
in

in most cases necessary for restoring to the lungs their lost elasticity and tone.

C A S E II.

RICHARD DUNPHY, of whom some account is to be given in this place, was about the age of forty when first attacked with the asthma. During the winter season, in particular, he was subject to frequent fits of his disorder; and, in the intervals of them, was affected with more or less of difficult breathing. He laboured under his disorder twelve months and more, when he first applied to me in April 1785. Several remedies were tried, such as antispasmodics, blisters, expectorants and others, with little or no alleviation of the symptoms: indeed the disorder seemed to gain ground, notwithstanding the repeated use of them for the space of seven weeks.

Finding very little probability of gaining any advantage by the medicines of the *Materia Medica*, I thought myself bound to recommend a trial of the cold bath, from the glaring proofs of its efficacy in the case just now related ; nor had I any cause to repent of my rashness, as the patient soon experienced the happiness of getting rid of a disorder which must have inevitably terminated in his death. By his own account, it appears that he had not bathed above six days, when he found a very sensible change for the better ; and by continuing the practice once a day for seven weeks only, the asthmatic fits were totally removed.

On this occasion sea-bathing was made use of, and nothing was done previous to the course, except the taking of a mild purgative ; the precautions to be mentioned hereafter were not attended to in this, or in the case immediately following: both
patients

patients were constantly employed in bodily labour; and on this account they probably did not stand much in need of a preparation for sea-bathing, by having first bathed in water of a warmer temperature.

C A S E III.

RICHARD HOLLAND, ætat. 48, was subject to a cough at different times, for several years, but was at last suddenly seized with a fit of the asthma at night, that obliged him to sit up in bed till morning. From that time till he applied to me in April 1787, which was about two years, he was very few nights in the winter season free from an attack. In the summer season also, the fits very constantly returned. At all times his breathing was rather difficult, attended with a stricture at the chest, which seemed to impede the expansion of the lungs.

lungs. His cough, though generally hard through the day, was soft in the morning, and generally afforded relief. Being apprehensive of tubercles having formed in his lungs, from the long continuance of the cough previous to the asthma, I had some doubts about the propriety of cold-bathing: but on finding his pulse very regular between the fits, I concluded that they had not yet taken place, as a quickness of pulse is generally the consequence of such an internal irritation: I then, without waiting to see the effects of medicine, advised him, as soon as the season should advance, to make a trial of cold-bathing; and in order to induce him to it, I told him that there were little or no hopes of a cure from any other source. In defiance of the general outcry of his friends against the danger of the remedy, he followed my advice, and, to my astonishment, returned from bathing

in three weeks time, perfectly free from asthma, or difficulty of breathing of any kind.

C A S E IV.

WILLIAM DONOVAN, of this city, carpenter, ætat. 46, laboured under the asthma for seventeen weeks, when he came to me in September 1789. He informed me that, for a month before the asthma appeared, he was troubled with a cough. The asthmatic fits generally came on at night, though at times he would have two or three attacks during the day. His breathing between the fits was seldom or never free, particularly if he made any exertion that hurried him, as in walking smartly, or in attempting to ascend any eminence. During the above length of time that he was afflicted with the asthma, he was never able to work

one

one day at his trade. Being of opinion that medicine would avail him very little in his situation, I recommended a trial of sea-bathing. For the first week the water had no effect in diminishing the violence or duration of his fits, though in other respects, as in mending his appetite and spirits, he experienced some benefit. About the tenth day his breathing began to grow better; and by continuing to bathe every day for three weeks only, he got completely rid of his asthma. At the present time, he is as well able to work at his trade as ever.

C A S E V.

MICHAEL M'BAY, ætat. 22, by exposure to cold, got a severe cough that held him for three months, and then terminated in a tightness of the chest, lowness of spirits, distension of the stomach, and flatulence. He
was

was not many days troubled with these symptoms, when he was suddenly seized with a difficulty of breathing, that seemed to threaten immediate suffocation. About twelve o'clock every day he had an asthmatic paroxysm of this kind for upwards of three weeks: but by degrees they began to disappear; and when he came to me in June 1789, his chief complaints were, distension of the stomach from wind, low spirits, and stricture across the lower part of his chest. He told me that he had applied to different practitioners, without receiving any benefit from their prescriptions. Judging that the usual remedies, in such cases, had been administered, I applied a blister to the lower part of the chest, and directed him, as soon as the part should heal, to plunge himself in a river every morning, it being at that time the only bath that could be conveniently procured. He followed
my

my advice, and came every day to inform me what effect the water had on him.

It is curious enough to find that, during the time of immersion, the stricture at his chest, and any uneasiness he had in his breathing, vanished instantaneously, and did not return for a considerable time after he came out of the water. To make use of his own phrase, he felt his chest grow wider; and this effect was produced on the first, as well as on every other subsequent bathing. Finding, however, after the expiration of eight or ten days, that he did not mend according to my expectations, I thought that sea-bathing might produce that permanency of effect which was experienced in the former cases. But in this I was disappointed. After bathing in the sea for three weeks, he had still some remains of the weight and stricture of his chest; but his lowness of spirits, distension of the stomach, and other nervous

nervous and hypochondriacal symptoms were completely removed.

Though a radical cure was not obtained by the bath in the present case, it nevertheless operated in such a manner as to strike the mind with a full conviction of its efficacy in suppressing the spasmodic affections of asthma; and it is more than probable, from the great benefit this patient received, that had he persisted in bathing for some time longer, a complete cure would have been the consequence.

C A S E VI.

MR. H. ætat. 30, of a melancholic temperament, and subject at times to vomitings, lowness of spirits, giddiness, and other symptoms of hypochondriasis; at length was suddenly seized with a slight fit of the asthma, about twelve o'clock at night.

About

About the same hour every night for the space of three weeks he had an attack, and every succeeding one was more violent than the former.

Dr. Thomas Butler, a physician of eminence in this place, and I, were called to his assistance.

On examination, we found that his disorder had already made a considerable breach in his constitution: his pulse was small, slow, and extremely feeble; he was much reduced in flesh; his hands trembled; his limbs tottered under him; and he seemed scarcely able to walk across the floor. Besides this general state of debility, he complained of a stricture and weight of his chest in the intervals of the fits, that took place on the fifth or sixth day of his disorder.

To remove the stricture, and prevent the return of the paroxysm at night, a blister was applied to his chest; and a draught,
with

with paregoric elixir, and some drops of the theb. tinct. to render its operation the more effectual, was prescribed, with directions to have it administered about a quarter of an hour before the usual time of the coming on of the fit.

The report next morning was as follows :

24th. Had a violent fit at the usual hour, and seems quite low and exhausted this morning, notwithstanding his blister rose well, and he took the draught as directed.

On this Dr. Butler proposed the use of the Peruvian bark, in as large doses as the stomach could bear; and from the periodical nature of the complaint, and the enervated state of the patient, it seemed to be particularly well adapted to his situation, and to promise more success than any other medicine whatsoever. It was combined with valerian, in the following form :

M

Rx. Cort.

℞. Cort. Peruv. Rub. pulv. ʒj.

Rad. Valer. Sylv. pulv. ʒiij.

Syrup. Zingib. q. s. ut fiat Electar.—cujus fumat
æger cochleare parvulum 2da quaque hora.

25th. He is considerably better this day, though the medicines disagree with his stomach. He had but a slight fit this morning at four o'clock, that disappeared in a few minutes. The electuary was continued in the same form and quantity.

26th. He is not so well this morning as yesterday: had a fit, about four o'clock, that held him three quarters of an hour.

27th. The paroxysm came on about three o'clock, and continued an hour. The electuary still produces sickness of stomach, and other distressing symptoms.

To obviate these complaints, and to throw in a greater quantity of the bark if possible, it was given to him in the form of pills, with an aromatic; and as the flowers of
zinc,

zinc, it was supposed, might assist its operation, they were substituted in room of the valerian, and joined to the bark.

28th. The fit returned at two o'clock, and continued about an hour and a half, of the same violence as the night before.

29th. He had a return of the asthmatic fit last night, that continued above an hour.

30th. He had a violent attack, which lasted between two and three hours, though he increased the dose of his pills, so as to have taken on the 28th and 29th an ounce of bark, and twelve grains of the flowers of zinc each day.

From the foregoing reports, we see that the Peruvian bark, on the first days of its administration, considerably checked the progress of the asthma; but that, as soon as the system became habituated to it, its efficacy began to diminish every day, till at

length it produced no good effect whatsoever.

It appears extremely probable, indeed, that if the bark could have been given in sufficient quantity on the first onset, a complete stop would have been put to the fits: this, however, was rendered impracticable, by the delicate state of the patient's stomach; and all our hopes of a cure from this source were frustrated. The addition of the flowers of zinc did not render it more effectual.

It is worthy of notice, that, at the time the bark seemed to operate most advantageously in combating the disease, it had little or no effect in restoring the patient to his former state of vivacity and vigour; he still remained depressed in his spirits, feeble in his limbs, and in every respect as enervated as before he began to make use of it.

This disappointment from medicines of

the most promising nature, fully justified a trial of some very active and powerful remedy. Accordingly, from my experience of its efficacy in the preceding cases, I suggested to Dr. Butler the use of sea-bathing, as the only expedient now left that afforded any flattering expectations. To this he readily assented, and informed me, that an asthmatic, by his advice, had recourse to it very lately with extraordinary success. To prepare our patient for bathing in the sea, an artificial salt bath was immediately got ready; and, on the first immersion, he had no return of the paroxysm that night, though he awoke at the hour it usually came on. In this manner he passed five or six nights free from any threatening of an attack; but on going into the bath one morning, he unfortunately got cold, and, in consequence thereof, he had a slight fit that night.

As he got directions to repair to the sea

after a few dips in the artificial bath, it happened unluckily that he went there at the time he got this relapse from cold: for, during the first week of bathing, instead of any amendment taking place, we find him grow worse and worse every day.

At the end of this period, however, he began to improve; and, in the short space of a fortnight, he completely recovered his appetite, his strength, and his spirits.

Besides this re-establishment of his general state of health, he had scarcely any remains of the asthma; not more, in fact, than what shewed that the tendency in the system to renew the fits was not entirely eradicated. For the last week he was quite free from asthma, except once or twice that he had some uneasiness in his breathing, that vanished in a few minutes.

Deluded by these appearances, of a complete recovery, and seized with a strange
and

and unaccountable insensibility of the precarious situation in which he still remained, he relinquished the water, in direct opposition to the advice of his physicians, and the eager and pressing sollicitations of his friends. During six weeks from the time that he left off bathing in the sea, he remained without any perceptible alteration for the worse ; but by frequent attacks of cold, his disorder returned to its ancient form.

In the preceding cases, it has been my chief aim to relate, in a plain and perspicuous manner, the history of the disease in each of my patients, and the effects of cold-bathing on them, without any wish or desire to exaggerate its virtues. Let others decide how far they may serve as examples worthy of imitation. Though conscious of not having been deceived by false appearances in the observations I made, and

that I have not been duped by any partiality to the practice in question, I still think it necessary, from the difficulty that attends the ascertaining of facts, to strive to establish the safety of cold-bathing in asthma, by arguments drawn from a different source to that of the experiments above mentioned, and to answer every objection that can possibly be made against it.

Thus both facts and reasoning will unite in confirmation of this practice, and will exhibit a body of evidence in its favour, as strong and convincing as is generally met with on a subject of this nature.

C H A P. VII.

COUGHs, catarrhs, and other disorders of the lungs, are very common in the winter season, in all cold climates. Such complaints are, with some reason, supposed to originate in suppressed perspiration, or in a change of the circulation of the fluids from the external to the internal parts, in consequence of the operation of cold. - On either supposition, cold-bathing must be looked upon as a very extraordinary mode of cure for any pulmonary affection. And as it appears from daily observation, that the application of cold is the most frequent cause of asthma, cold-bathing must be as prejudicial in this, as in any other complaint of the lungs whatsoever.

It

It happens to be the case with asthmatics in general, as it is with persons who have other complaints of the lungs, that the winter season is, for the most part, injurious to them: hence it follows, that cold-bathing, whose operation is similar to that of cold air, must be a precarious remedy in the asthma. These are the principal arguments that, in my opinion, can be advanced against cold-bathing in the asthma; and in all probability they have had very considerable weight with physicians: but how far they were authorized to reject this practice on such grounds, will be seen by the following enquiry.

On examining a number of persons with various complaints, and of different ages and constitutions, who have bathed for a season in the sea, it will in general be found, that few of them have been attacked with coughs or catarrhs. This may afford some room
for

for speculation to a person who would consider that, perhaps, the major part of them repaired to the water without consulting any physician on the propriety of such an undertaking. It must, indeed, appear surprising how such a number of valetudinarians escape with impunity, when we consider the danger that is supposed to arise from the suppression of perspiration.

However, not only the vigorous and healthy, but also the feeble and enervated, seldom experience any complaint of the lungs from the operation of this element. Even people of the latter description are often obliged to withdraw themselves from bathing, in order to avoid many disagreeable and distressing complaints, among which a cough or catarrh is very rarely discovered. What conclusion are we to draw from such premises? The most obvious and natural one is, that though the perspiration be suppressed,

pressed, and the fluids be driven from the external to the internal parts during the time of immersion, they are in general restored to their former situation shortly after the operation of the water is over. If this inference be not admitted, at least it is natural to suppose that, in the customary way of cold-bathing, the action of the perspirable matter on the lungs is not of a very formidable nature.

From the well-known astringent effects of cold water on the surface of the body, it is reasonable to believe that a temporary check is put to the perspiration in every instance of cold-bathing: but how or in what degree it is productive of disease, is probably a matter of difficult investigation.

Without being under the necessity of indulging the imagination in any fanciful theory, we can prove, from incontrovertible facts, that a very great latitude may be
 allowed

allowed in cold-bathing, without any danger from the retention of the perspirable matter.

Fishermen often remain up to the middle in water, for the greater part of a day, without receiving any injury. Persons who are employed as assistants at bathing places, have the greatest part of their bodies under water for several hours every day during the season, without finding any inconvenience from it by cough, catarrh, or any such disorder.

If we were to reason *a priori* on an experiment of this kind, without waiting for the event, we would readily agree about the consequence: we would not hesitate to declare, that some alarming disaster must attend the experiment; that a stubborn cough which may end in a consumption, an insuperable inflammation of the lungs, or some
other

other very formidable distemper, must necessarily arise from suppressed perspiration.

Such are the dangers which the fancy, heated with theory, will portend on such an occasion. But how weak its fears, and how groundless its apprehensions, when a person, after residing for six or seven hours in the water, discovers not the slightest tendency to disease ! This fact (which will be satisfactorily explained hereafter by some observations of Dr. Gardiner) is adduced for the purpose of banishing from the minds of people their fears with respect to the influence of cold-bathing on the perspiration.

But arguments may, perhaps, be advanced against this doctrine, and with the effect of overthrowing it. Thus it may be said, that those who are so much accustomed to the water as the fishermen, &c. just mentioned, cannot possibly experience its ordinary effects :

fects: that the power of habit in resisting the cause of disease, is not more evidently displayed on this occasion than on many others which daily present themselves; and that, of course, the examples brought forward in support of cold-bathing, cannot amount to any clear or satisfactory proof.

As a farther confirmation of this reasoning, it may be alleged that, in many instances, especially on the first onset of bathing, a diarrhoea occurs, which must originate in the action of the perspirable matter on the intestinal canal.

The power that the human body possesses of resisting the operation of cold, is allowed by all philosophers to be very considerable, however they wish to account for it; and when to this is superadded the power of habit, it must be very great indeed. But, that in consequence thereof it should be capable of preventing the effects of suppressed perspiration

perspiration on the body, is a conjecture supported by very little probability.

In the first place, it is evident that the water, during every month of the summer, is so many degrees below the ordinary temperature or standard heat of the human body, that such a constriction is induced on the exhalent vessels, as effectually prevents the escape of that invisible halitus that constitutes the matter of perspiration. Hence, considering the quantity of perspirable matter that is accumulated in the body during a person's residence for several hours in the water, it is improbable to suppose, that the natural resisting power of the constitution, the power of habit, or the co-operation of both, can guard against a catarrhal affection, if, in any instance, it arose from suppressed perspiration.

When a person makes use of the water medicinally, and remains in it but a few
seconds,

seconds, such a brisk vibration of the fibres, and such a universal glow of heat in general succeed, that any danger which might be apprehended from suppressed perspiration will be effectually obviated by such vigorous exertions of the system : but if the body be immersed in cold water for five or six hours, no such effort can take place as may be supposed to counteract, in any habit, the agency of the perspirable matter on the lungs.

As to the other argument, I think its fallacy may be easily exposed. Many instances of the most violent state of costiveness have occurred, wherein all the usual remedies were judiciously employed without the smallest advantage, when the dashing of a few bowls of water on the abdomen, or lower extremities, had the happy effect of procuring an instantaneous evacuation. Here it would be extremely unphilosophical to suppose, that the feeble action of the per-

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spirable

spirable matter on the bowels removed the constipation, when it can be more rationally explained on the principle, that the water, by its shock or stimulus, brought on an extraordinary degree of action in the bowels, by which they got rid of their contents.

If the diarrhoea of cold-bathing had its origin in obstructed perspiration, how comes it to pass that the lungs are not affected by the same cause and at the same time with the bowels?

The internal surface of the lungs seems as liable to be acted upon by the perspirable matter as that of the intestinal tube: How are we then to account for the absence of catarrh when a diarrhoea occurs? A little attention to the difference of structure in these organs will clear up this point. Thus aloes and colocynthida rubbed on the integuments, will often bring a diarrhoea, from the sympathy that subsists between the external
and

and internal parts. In like manner cold water, by its stimulus to the abdomen, will sometimes act as powerfully as a brisk purgative: but the lungs, not being of a muscular structure, are not so susceptible of impression from the temporary action of stimuli externally applied, and, of course, will not be so readily affected by cold-bathing as the bowels.

It is possible that the diarrhœa of cold-bathing may sometimes arise from a redundancy of bile in the bowels; and this may be attributed to the effect of the water in determining the perspirable matter to the liver: but the explanation will be more satisfactory, by supposing that the stimulus of the water is communicated to the vessels that pour out the bile, and thus occasions a plentiful flow of it into the bowels.

To illustrate and confirm the preceding doctrine, I will present my readers with

some observations in point, from Dr. Gardiner's excellent Treatise on the Animal Economy. They will also be found to contain a very just and satisfactory rationale of the *modus operandi* of cold in the production of catarrh.

Dr. Gardiner, not considering obstructed perspiration the cause of catarrh, makes use of the following reflections :

“ An invariable effect of cold during its
 “ application, is a diminution of perspira-
 “ tion, from the constringing action of cold
 “ on the vessels of the skin. But this usu-
 “ ally happens without any injury to the
 “ body : for the person no sooner moves
 “ himself into a warmer air, than his per-
 “ spiration is again increased, in proportion
 “ to the degree of heat applied. But with
 “ regard to the quantity of perspiration or
 “ degree of cold that may be endured with
 “ impunity, custom allows of a considerable
 8 “ latitude.

" latitude. Shepherds, on the mountainous
 " parts of this country, bear the cold of
 " winter surprisngly : and I have known
 " the guides where sea-bathing is used, have
 " the greatest part of their bodies immersed
 " five or six hours every day for several
 " months together in water above forty
 " degrees colder than the temperature of
 " their bodies. For unless the cold is so in-
 " tense, or continued so long as to affect the
 " energy of the nerves, it produces no bad
 " consequences. I mean not to say, that
 " long obstructed perspiration is not hurt-
 " ful to the constitution ; for certainly it is
 " often a principal agent in the production
 " of scurvy, dropsy, and other disorders :
 " but that a temporary obstruction of per-
 " spiration on catching cold, or at the com-
 " mencement of a catarrh, should be the
 " cause of the disease, I have never yet been
 " able to comprehend. The spasm on the

“ extreme vessels of the skin, with some-
 “ times a slight degree of vigour about the
 “ beginning of the disorder, returning at
 “ uncertain periods, and commonly of short
 “ duration, can have very little influence.
 “ For although a free perspiration contri-
 “ butes in general to the relief of parts
 “ affected, as shall afterwards be more par-
 “ ticularly noticed, yet profuse sweats are
 “ not uncommon during the continuance of
 “ the disease, without any alleviation of
 “ the symptoms, when the cause of it has
 “ operated strongly on the system.”

After quoting the statical experiments of
 Dr. James Keil, which prove that a con-
 siderable increase or diminution of perspi-
 ration may take place in twenty-four hours,
 without any apparent injury to health, or
 the smallest tendency to catarrh ; he reasons
 in the following manner :

“ The sympathy between the nerves of
 “ the

“ the skin, from the application of a certain
 “ degree of cold, and those of the internal
 “ membrane of the bronchii, is so remark-
 “ able, that many delicate persons are im-
 “ mediately seized with a cough, when part
 “ of their body, and especially their feet,
 “ have been exposed to a severe cold, inde-
 “ pendent of the application of cold air to
 “ the lungs. And if, the instant a person
 “ perceives it to have this effect, he moves
 “ into a warmer situation, so as to become
 “ comfortably warm, the cough soon leaves
 “ him. But if he shall remain, or be un-
 “ avoidably exposed to the cold for some
 “ time, the cough may continue for a shorter
 “ or longer period, and be attended with all
 “ the effects of slight or severe catarrh, ac-
 “ cording to the time he was so exposed.”

Gardiner's Observations on the Animal
 Economy, p. 245-46.

From the foregoing observations, I expect

it will appear, that we need not in general be very much alarmed about the effects of obstructed perspiration in the ordinary way of cold-bathing : it will now be necessary to take a more particular view of it with respect to its operation on asthmatics.

In the greater part of the disorders of the lungs, as in ulcers, tubercles, recent coughs and catarrhs, &c. more or less of inflammation is commonly found to accompany them. So susceptible of the action of cold are the lungs rendered in consequence thereof, that cold-bathing cannot possibly be ventured upon without the most imminent danger : let us therefore adopt what theory we will, whether that of suppressed perspiration with writers in general, or that of nervous sympathy with Dr. Gardiner, an increase of the preceding inflammation, and of course an aggravation of all the symptoms, must necessarily follow. Without due
attention

attention to the nature of asthma, we are apt to conclude, that consequences equally alarming will attend the use of cold-bathing in this disorder also. But a little reflection will banish such an ill-founded conjecture.

In the first attack of the asthma, we often discover symptoms of inflammation, or we find the disorder of such a mixed and complicated nature, that the exact line of distinction between a spasmodic and an inflammatory affection of the lungs cannot be easily drawn. This stage, however, passes off in some time, and the disorder assumes the form of a genuine unmixed spasmodic complaint. When this period once arrives, and if the disease be kept up by the power of habit, as is most commonly the case, we should endeavour with all our might to counteract it; and, for this purpose, no danger can in general attend the use of cold-bathing. Every symptom of inflammation, or tendency to it, has now disappeared; and in
these

these cases we have, for the most part, an opposite state to that of inflammation to deal with. In this stage and form of the disease, perhaps, the greatest danger to be apprehended from cold-bathing is some inconsiderable catarrhal affection, or, at worst, a return of the asthmatic fits. It is even highly probable, that such consequences are never experienced from the operation of the water itself.

We know to a certainty, that spasms in the stomach and bowels returning periodically, and continuing for a length of time from a morbid state of irritability, have been very frequently removed by sea-bathing. Obstinate vomiting, which often depends on similar causes, has been radically cured by the partial application of cold water to the region of the stomach, after every other powerful remedy was tried in vain. In cases of violent hysteria, cold water, applied to the same part, has had an immediate

immediate powerful effect in removing that suffocating distention attendant on the hysteric paroxysm *. Here we have convincing proofs that cold water may be applied to the stomach during the existence of spasms therein with safety and advantage ; and as this is the case, it is to be presumed that cold-bathing may be used in spasmodic asthma, without any danger from suppressed perspiration, or any other mode of action whatsoever.

But some objections may, perhaps, be raised against this conclusion with respect to the asthma.

It may be alleged, that the functions of the lungs are altogether so different from those of the stomach, that it is improper to reason by analogy from the one part to the other : that the lungs, from their situation and many other causes, are so readily acted upon in a

* Vide London Medical Journal, vol. vii. p. 123.

diseased

diseased state by cold, that the external application of cold water may injure them when attacked with spasms, though it should relieve the stomach when labouring under the same disorder.

But though we should admit this reasoning to be in a great measure well founded, the consequence still does not follow that immersion in cold water is prejudicial; for it will immediately appear that cold-bathing may be useful to asthmatics, though they should be materially injured by the partial application of cold.

Coughs, catarrhs, &c. are, for the most part, found to arise from the partial application of cold. Such complaints, no doubt, are sometimes brought on by cold applied in a general way: but while we look upon this operation of cold in affecting the lungs as an occurrence by no means frequent, we must consider its common mode of action
in

in most cases to be in a partial way. Thus we find the lungs of some delicate persons are readily affected by cold applied to the feet; nay, by such a moderate degree of it, that had it been applied to the whole surface equally by immersion, or in any other manner, no morbid alteration would in all probability have taken place in any particular part. Moreover, it appears that the first threatenings of catarrhs, inflammations, and other disorders of the lungs, are often occasioned by the partial application of cold air to the lungs when the body is overheated, and are found to arise in a mild season, if the air be directed to the lungs in a stream or current, as by sitting at a window, or exposing the body in any situation by which a similar effect may be produced. It should also be observed, that in these cases the disorder is generally slight at the first onset, till, by unguardedly exposing the body again

again and again to the air, the affection arises to such a pitch as to be attended with danger.

This subject is well illustrated by the following passage from the ingenious author already mentioned :

“ Although an accidental exposure to an
 “ intense cold for any considerable time is
 “ soon followed by a catarrh, catarrhal or
 “ inflammatory fever; yet the effect of such
 “ changes in the weather as are related in
 “ p. 168, are commonly flow, and do not
 “ affect the health in any remarkable
 “ manner for some time, because it is not
 “ the cold of a few hours which affect
 “ people in general. It usually requires
 “ the operation of some days before such
 “ changes can be brought on the system as
 “ are mentioned in p. 146-7, by which the
 “ Doctor means a catarrh, when got to a
 “ considerable height.” He proceeds and
 says—

says—" On such occasions its operation is
 " continued, as it were, by prizes or succes-
 " five additions. It is not the cold of one
 " day, but of several, that is capable of pro-
 " ducing such considerable effects on the
 " arterial system and mucous gland : these
 " at first are of a slight nature, but gradually
 " increase according to the circumstances of
 " exposure to the weather, and constitution
 " of the person, until a præternatural sen-
 " sibility and irritability of the system,
 " which always accompany and keep pace
 " with the morbid effects of cold, arise to
 " such a degree as, in conjunction with
 " the stimulus of a collection of phlegm in
 " the stomach and bowels, from a diseased
 " secretion of it in the viscera, an accession
 " of the fever is brought on."

From the foregoing enquiry it appears,
 that when the cold of our atmosphere is
 productive of catarrhal affections in healthy
 people,

people, it commonly operates in a partial manner, and, except it be very intense, requires some days (at least it requires to be reiterated at different times) before it is capable of bringing on any considerable morbid affection. Let us now endeavour to find how asthmatics are affected in similar circumstances.

From the violence offered to the lungs in every fit of the asthma, from the origin of the disorder and other causes, it is no way surprising that such a degree of sensibility is induced, as to render these organs very susceptible of the action of cold. Accordingly we find no description of people more subject to slight coughs and catarrhs, than those who are afflicted with the asthma. Nevertheless, every day's experience demonstrates that such attacks do not often terminate in catarrhal fevers, pleurifies, or any disorder accompanied with symptoms of much inflammation.

mation. If this observation be well founded, it must be granted on all sides, that asthmatics *cæteris paribus* are not more liable to inflammatory affections of the lungs than persons who enjoy good health, and are possessed of robust constitutions. It has been commonly remarked by medical writers, that those who labour under spasmodic complaints, are seldom attacked with inflammatory disorders. Exceptions to this general rule, no doubt, will sometimes occur; but the *prædisposition*, so necessary for constituting what is called by physicians the *phlogistic diathesis*, being absent in these cases, the occasional cause must operate with more than ordinary intensity and power, to be capable of producing an inflammatory disorder.

This circumstance alone should, in my opinion, be considered a strong argument in favour of cold-bathing in asthma; for if, in general, people of sound lungs, and good
O constitutions,

constitutions, are injured as materially by the application of cold air as asthmatics, how is it possible that immersion for a few seconds in cold water, that acts equally on every part of the surface at the same time, can be attended with any dangerous or alarming consequence in the asthma?

But though it should be granted that the lungs of asthmatics are more liable to inflammatory affections from cold air than people in health, does it follow of course that cold-bathing is prejudicial in the asthma? I apprehend it does not. There are many persons altogether so delicate as to get coughs and colds at almost every blast of sharp air, who find not the smallest inconvenience from bathing in cold water: for, instead of proving hurtful, it is in many cases the best and only remedy for guarding the body against this effect of the air. This appears in a great measure to be the case with asthmatics;

matics ; and it would be as injudicious to reason from the effects of air to that of water in the one case as in the other. Many causes in the different scenes and occupations of life, which cannot possibly have any influence when cold-bathing is employed, must often co-operate with cold air in injuring the lungs of asthmatics. Thus, the vicissitudes of the seasons, the unguarded exposure to cold and rainy weather, the removing from a warm temperature immediately into a cold one, with various other accidental causes, must frequently prove very considerable auxiliaries to the action of cold air. Compare an asthmatic circumstanced in this manner, to his situation when, in a mild season, he is plunged into the cold-bath ; and can there, with the least propriety, be any analogy established between them ? Can there exist in nature any two causes that appear to differ more widely in their

manner of acting on the human body? The difference of density in the two fluids—the re-action that takes place after the one, and not after the other—the vast length of time a person may be exposed to the air in comparison to that of the water, must totally change any similarity of action that could be supposed to subsist between them. Moreover, it should be taken into consideration, that cold air, when productive of disease, is very frequently applied in a partial manner; while, in bathing, the cold water is applied to every part of the surface at the same time, and, of course, cannot operate so powerfully in bringing on catarrh, or any other dangerous attack of the lungs. Hence, though the lungs of asthmatics be more delicate than those of people in general, and in consequence thereof are more readily disposed to catarrhs and pleurisy from the cold of the atmosphere, still it cannot be inferred that cold-

cold-bathing is a dangerous remedy in the asthma.

But in order to shew more clearly how fallacious it is to reason by analogy from the action of cold air to that of water in any disease whatsoever, I shall take the liberty of advancing a few facts, which, in my apprehension, will place this matter beyond the reach of doubt or uncertainty: they will also prove a full confutation of the last argument* that was supposed to be advanced against cold-bathing in the asthma; to wit, that the cold of winter being in general hurtful to asthmatics, cold-bathing must of course be a very precarious remedy in this disorder.

The cold bath is, in many instances, the most effectual remedy in chronic rheumatism, though the cold of our atmosphere in general first gives rise to the disease, and is frequently the sole cause of preventing us

from obtaining a cure. During the intervals of the gout, especially when it has some tendency to an atonic state, cold-bathing has been employed with great success: yet it is universally known, that cold air is pernicious to gouty habits, for in every cold climate the winter is found to aggravate the disease. In some cases of palsy, cold-bathing has proved very powerful in restoring lost sensation and motion; though residing in a cold climate is, for the most part, prejudicial to paralytic limbs. Having finished this defence of cold-bathing in the asthma, we shall endeavour to point out, in the following chapter, the particular forms or varieties of the disease that will admit of its application.

C H A P. VIII.

TO ascertain with any degree of precision those cases of asthma wherein cold-bathing may be used without danger, is an undertaking of much difficulty, from the neglect of physicians with respect to this practice, and the consequent deficiency of facts to guide us in our researches. In truth, the importance of the subject, the apparently dangerous nature of cold-bathing in such a disorder as the asthma, demand our most serious consideration, and should deter us from advancing any doctrine or opinion but what is founded on experiments and accurate observation. Fully per-

suaded of the propriety of adhering to this system, we will endeavour to regulate our conduct accordingly.

The following are the disorders which, joined to the asthma, may be supposed to preclude the use of cold-bathing. Particular attention will be paid to every combination, and reasons assigned for retaining or exploding the practice in each.

Ulcers in the lungs.

Tubercles.

Inflammation of these organs.

Catarrh, recent.

Catarrh of a long standing, attended with expectoration of much phlegm, as in that species of the disease called humoural.

Plethora, both partial and general.

Dropfy of the chest.

Mal-conformation of the chest.

Difficulty of breathing from various causes.

Ulcers

Ulcers in the lungs, when complicated with asthma, still retain their characteristic marks, and are readily discovered by emaciation, purulent spitting, and other symptoms of consumption of the lungs. When this event has once taken place, it is unnecessary to caution practitioners against the cold-bath in such a situation. The diagnostics, however, are more difficult when tubercles occur at the same time with the asthma.

It is a common opinion with physicians, that when the asthma terminates fatally, it is in general owing to the formation of tubercles, which, in length of time, come to suppuration, and thus produce a pulmonary consumption. Such tumours are said not to supervene for a considerable time after the first appearance of the asthma, and are supposed to arise from the violence done to the lungs by the repeated attacks of the spasms.

In

In some instances the tubercles might have existed previous to the asthma, and acted as an exciting cause to the disorder; but this I believe to be a rare occurrence. In either case, we are to form our opinion of the existence of tubercles, by attending to the following circumstances :

It is supposed that tubercles, from their indolent nature, may remain a long time in the lungs without coming to suppuration, and it is possible that this may sometimes be the case; at the same time, I am persuaded, that they seldom remain for any time in such an indolent state in the lungs of asthmatics, as not to afford some external sign, whereby we can judge of their existence with a high degree of probability. For my part, I have never met with any combination like this, wherein a quickness of pulse, seldom less than ninety strokes in a minute, did not constantly attend it; nay, the more frequent

quent the pulsations were, the more imminent was the danger, and the sooner a pulmonary hectic fever was formed. How is it possible that, in such a disorder as the asthma, tubercles can remain for any length of time in an uninfamed state, since the repeated attacks of the fits must prove such a cause of irritation as will speedily inflame them? Hence, if, in the advanced stage of asthma, a quickness of pulse approaching to fever height, with more or less of difficult breathing, be discovered, it is to be feared that the lungs are obstructed with tubercles. In such circumstances, cold-bathing would be attended with the most pernicious effects. Indeed, without any view whatsoever to tubercles, when such symptoms as quickness of pulse and difficult breathing are combined with the asthma, they are of sufficient magnitude to deter practitioners from any idea of bathing, as they clearly demonstrate
that

that the lungs are in a state of inflammation.

Catarrh of a long standing, &c.—The different organs of the human body, as the stomach, intestines, bladder, &c. that are supplied with mucous glands to protect them from the action of various kinds of stimuli, are readily affected by cold, if the slimy matter that lines them happens to be poured out in any considerable quantity. The subjacent nerves, thus stripped of their covering, acquire an uncommon degree of sensibility. In the humid asthma (as it is called), besides that from the spasmodic affection, there is the delicacy in question superadded in consequence of the large quantity of mucus that is at different times discharged by coughing: so that, from reasoning *a priori*, it is not to be supposed that the lungs, in such a state, can possibly escape
with

with impunity, if cold-bathing be employed. But however plausible this reasoning may appear, it must still give way to the more solid and irrefragable testimony of facts. If we look back to the cases in which cold-bathing was used, it will be found that the major part of them were attended with a copious discharge of phlegm ; and in place of checking the spitting, and rendering the breathing more difficult as might be expected, the water had always the contrary effect, by promoting this evacuation, and relieving that uneasy sensation of stuffing in the chest.

I have lately had an opportunity of seeing the cold bath afford more relief to a person labouring under an old catarrh, than all the remedies that experience had approved of in that disorder. The patient indeed made the experiment without any medical advice; nor is it to be supposed that any practitioner from theory alone would ven-

ture to give his sanction to a practice fraught with so many appearances of danger. In the chronic stage of dysentery, when a white flux is kept up by the remaining delicate state of the bowels, bathing in the sea was not found to occasion a relapse, or aggravate the prevailing symptoms. Dr. Blane, in his Observations on the Diseases of Seamen, remarks, when treating of the dysentery, that though cold was in general hurtful and unsafe, he saw the sailors, who, from their habits of life, are commonly heedless, bathe in the sea when labouring under what they called the white flux, without any bad effects. In short, if the precautions to be mentioned hereafter be carefully attended to, there is not a doubt but that cold-bathing may be employed with as much safety in the humid asthma, as in any other variety of the disease, on condition that the breathing is not rendered difficult in the intervals

tervals of the fits, by an accumulation of phlegm in the lungs. If this should happen to be the case, it will be necessary, previous to bathing, to evacuate any such matter by emetics, blisters, and medicines intitled expectorants.

Catarrh recent.—Though we have spoken with so much confidence in favour of cold-bathing when asthma is complicated with a catarrhal affection of a long standing, we must totally reject this practice in the case of a recent cough or catarrh. Both these disorders in general proceed from the same source, yet demand very different modes of treatment. In the recent catarrhal complaint, there is always more or less of an inflammatory tendency that requires cooling medicines, and what the physicians term the antiphlogistic regimen; while in the other a state of relaxation takes place, and demands

mands the assistance of stimulants and tonics; and from them alone can we expect to reap any benefit or advantage. Hence it will readily appear why cold-bathing may be pernicious in the former, though success may attend its application in the latter. No people whatsoever are more subject to slight coughs and catarrhs from cold than asthmatics, and physicians should be very cautious how they prescribe cold-bathing while any degree of this affection exists. It is true, that there are few instances of asthma in which we do not find a cough more or less troublesome attending them, and that too in the intervals of the fits; but a little attention will render us capable of distinguishing this habitual cough, the concomitant of asthma, from that which had been lately caught by exposing the body to cold air.

When a person labouring under the
asthma

asthma has, in the common phrase, caught cold, he finds his cough, if he had one before, very much aggravated—his chest unusually bound—a stuffing in his head, with other symptoms expressive of the operation of cold. From the delicate state of the lungs in asthma, we may often expect to find such effects as these; and though, when considered as constituting a morbid affection, they do not generally arise to such a pitch as to be attended with much danger, cold-bathing, nevertheless, cannot be used with any safety during their prevalence.

Plethora.—In corpulent and plethoric habits, a fullness or accumulation of blood in the vessels of the lungs, seems in a good measure to contribute to the asthma; and the idea receives weight from this circumstance, that the application of cold, which is very powerful in bringing on internal congestion,

is most commonly the exciting cause of the first attack. From this account, and from the nature of the remedies that are found to succeed in plethoric asthma, as bleeding, blistering, &c. it may appear rashness in the extreme to suggest such a method of cure as cold-bathing; for the difficult breathing that so constantly takes place in this form of the disease, and that too, in all probability, from some degree of obstruction in the lungs, together with the fullness of the habit itself, are circumstances so unfavourable to cold-bathing, that, in every case where such symptoms occur, the practice cannot be too strongly reprobated. But there are probably instances of asthma that can with propriety be called plethoric, wherein cold-bathing may be applied without danger. For example, if, after general and topical evacuations, by means of bleeding, blistering, &c. the disorder be brought to have
complete

complete intermissions, with a regular pulse, while at the same time no difficulty of breathing, or tightness across the chest is discoverable, there cannot be any solid objection to a trial of cold-bathing.

But, on the other hand, if proper evacuations have been omitted, or if, with their assistance, the necessary intermissions have not taken place, and that the patient labours under oppressed or uneasy breathing, every idea of cold-bathing should be laid aside, as a rupture of some blood-vessel in the lungs, or some other attack equally alarming, may be the reward of our temerity.

As some doubts may arise about the precise meaning of plethoric asthma, I think it necessary to point out the sense to which I would have it restricted in this place. It is universally allowed, that a plethoric state of the system may actually take place in habits that have very little appearance of obesity.

Those of sanguine temperaments, and robust constitutions, without arriving at that state which may be properly called corpulent, are the persons, I believe, most liable to a general plethora; and to such only would I allow the use of cold-bathing. When obesity occurs in any considerable degree, a partial plethora will be the consequence, from a greater determination of blood than ordinary to certain organs; and it is principally from this circumstance of inequality in the distribution of the blood, and not so much from the idea of a general plethora, that cold-bathing should be condemned in corpulent and bloated habits.

People of this description should be very cautious how they make a practice of cold-bathing, though they have at different times escaped with impunity, as the rupture of a blood-vessel in the head or lungs is always to be dreaded; and the probability of
such

such an event taking place should never be lost sight of.

Mal-conformation of the Chest.—Many persons afflicted with asthma have their chests so narrow and contracted, as might lead to an opinion of the disorder originating in such a formation. Whether this be the case or no, the fact is, that a plethora in the lungs may be often the consequence of this deformity; and the greatest danger to be apprehended in such a case, is the rupture of some blood-vessel in the lungs, from the change that takes place in the circulation during the time of bathing. A constant and uniform effect of cold water on the human body, is a languid circulation of the blood at the surface, and a proportional increase of this fluid in the internal parts, so that we can easily conceive how an asthmatic, with a chest so deformed as to give rise

to a plethora *ad spatium* in the lungs, may be attacked with spitting of blood from bathing in cold water. To obviate such an event, blood-letting may be employed, if it can be done with safety; the stomach and bowels be emptied, and, perhaps, a blister applied to the chest, as a topical evacuation in this case may be more effectual in removing the plethora than a general one, which acts on the system at large. Particular care should be taken to have the stomach empty in this variety of asthma previous to bathing, as any fullness or distention of this organ, by pressing on the diaphragm, must impede the expansion of the lungs, and in this manner co-operate with the water in bringing on a discharge of blood.

Dropsey of the Chest.—It is possible that in an early stage we may find this disorder
 complicated

complicated with asthma. In general, however, we must look for such a combination at an advanced period of the disease when its long continuance, and the injury offered to the lungs by its frequent repetition, will in a great measure account for the presence of water in the chest. The characteristic symptoms of water in the chest are on many occasions so very obscure, that the most discerning physician may be mistaken in his diagnostics: but when the symptoms of this disorder, as described by medical writers in general, supervene an asthma of any long standing, there can then be no doubt of its existence. Even though we should not be able to form a decisive opinion about the nature of this complaint, no bad consequence can possibly follow, as the reigning symptoms will fully point out the danger that must attend cold-bathing in such a situation.

Difficult breathing.—Though some observations have been made on this subject already, it is necessary to give it a more ample discussion in this place, as will appear by what follows :

As the greatest expectations are to be entertained from cold-bathing when the breathing is free and natural in the intervals of the paroxysms, so the more it deviates from this state, and takes on the form of uninterrupted difficult breathing, the more dangerous is the bath, and the more cautious we should be in making use of it. But if cold-bathing be confined to that form of asthma wherein the breathing is perfectly free when the fit passes off, we will, in the greater number of cases, be deprived of any benefit that may arise from it. That it may be more generally employed, and even extended to asthmatics with uneasy breathing, appears very clearly from the success that attended

tended the practice in similar cases ; for in most of the patients on whom the experiment was made, the breathing was more or less affected in the intervals of the fits.

Much discernment, however, is necessary for ascertaining the particular cases to which cold-bathing is applicable. In every instance where we can trace the affection of the breathing to plethora, tubercles, or obstructions of any kind, cold-bathing (as we noticed before) would be absolutely pernicious : it is in such cases only where the breathing is hurt by a spasmodic affection, that it can be ventured upon with any degree of safety. To distinguish the one from the other, it will be necessary to attend to the following particulars :

The breathing in the former is generally difficult, oppressed, and readily hurried by any exertion that accelerates the motion of the blood through the lungs. In the latter,
the

the patient complains of a stricture at the sternum, with a sense of weight pressing on the chest, and impeding the free expansion of the lungs. Together with this, the breathing will be sometimes found uneasy and readily hurried by motion, but by no means of so violent or permanent a nature as that which attends obstructions. When obstructions exist, the pulse is often quick and irregular; while, in the mere spasmodic affection, it is seldom quicker than the natural state *. After examining the patient with due attention, if we have any doubts on our mind with respect to the origin of the complaint, it may perhaps be useful to direct some powerful antispasmodic before we proceed any farther. If, during the operation of any medicine of this class, the uneasiness of breathing and stricture at the sternum be removed, we may, without hesitation, con-

* Vide p. 22.

clude that the affection is truly spasmodic, and on this presumption recommend the use of cold-bathing.

Persons advanced in years, from the languid state of the circulation, and the diminution of the vital powers, do not, in general, bear with impunity the change of temperature from our atmosphere to that of cold water. If the event of such a transition be dreaded when no disorder discovers itself, what evils are we not to apprehend when the asthma is added to years! What time of life should then be fixed upon as a boundary which we are not to transgress in directing the bath for asthmatics? It is impossible to determine this point with any degree of certainty. Different constitutions at the same time of life resist, with such various diversity of power, the operation of noxious causes, that no criterion or standard can be established for regulating a matter
of

of this kind. The remarkable success from cold-bathing in the case of Holland, near the age of fifty, demonstrates that, at such a period, asthmatics are not to be deprived of this remedy, except some disorder be added to the asthma, that would, from its nature, absolutely preclude it.

If we can rely upon the authority of Sir John Floyer, an asthmatic of sixty not only escaped with impunity, but obtained great benefit from cold-bathing. However, it is much to be dreaded that, at such an advanced period of life as this, the remedy would prove a greater evil than the disease, not merely from the debility that attends old age, but more especially from this circumstance, that the asthma of old people seldom appears in a simple form, but is generally complicated with obstructions of the internal parts, or such an affection of the lungs as must render cold-bathing highly pernicious.

CHAP.

C H A P. IX.

HAVING pointed out in the preceding chapter the particular varieties or forms of asthma that admit of cold-bathing, we will now beg leave to offer some instructions to asthmatics on the manner of using it to advantage.

In every case, before the patient attempts to bathe, it will be proper to empty the stomach and bowels, in order to give the lungs as much room as possible to act; and if he be of a full habit, a small bleeding may, on some occasions, be necessary. When any stricture is felt at the chest affecting the breathing, though no signs of obstruction exist, it will, in general, be a prudent

prudent measure to apply a blistering plaister to this part, and keep it open for a few days. Among the greater number of asthmatics, very few, I believe, can be found who on first exposing their bodies to the open air, as in the common way of cold-bathing, that are not liable to be affected with cough or catarrh; at least I had an opportunity of seeing several instances of this, though the patients were dressed and undressed with the utmost expedition, and received but one or two shocks from the water. This should put practitioners on their guard, and render them very cautious how they allow their asthmatic patients to bathe in open air on the first onset, for an interruption to the bath at best will often be the consequence, by means of a cough or some slight catarrhal complaint; and if, in such a situation, the bathing be continued, those salutary effects we were taught to expect will be defeated,

or

or something of a more serious nature may happen. It is always an easy matter to provide a temporary covered bath ; and as our future success in a great measure depends upon such a preparatory step, it should be established as a general rule, with hardly an exception, never to omit it *.

After bathing in this manner for some time, the surface of the body, and of course the internal organs, become more and more insensible to the action of the external air, till at length the body may be exposed to it with impunity, as long as is necessary for any purpose

* In preparing a bath of this sort, it should be contrived in such a manner as to have it strongly impregnated with salt: for, in the generality of cases, fresh water will not agree with the lungs of asthmatics. A person afflicted with the asthma was advised to go into a cold bath ; and as it was imagined that fresh water would answer the purpose, the patient went into it every morning for the space of a fortnight, without the smallest benefit ; but by adding a large quantity of salt to the water, the most visible good effects from it immediately appeared.

intended by the bath. This effect of the cold bath in rendering the surface more insensible to the operation of cold air, is not one of the least important advantages that attend it: for asthmatics in general, from this cause, are so subject to coughs and catarrhs, which often terminate in an attack of the asthma, or something more serious, that the utmost care and circumspection, the most powerful and approved of remedies, without the assistance of cold-bathing, will not be sufficient to guard against a relapse. However, no consideration of its utility in this way should make us tedious in our after-bathings in open air: the patient, as soon as he is undressed, should be plunged into the water without the smallest hesitation, and as quickly taken out, after receiving one or two shocks.

In some complaints, especially those of infants, for which cold-bathing is deemed
 necessary,

necessary, it has been found useful to raise the temperature of the water, by adding a certain portion of warm water to the cold, till, by degrees, the body is brought to bear the cold water without any addition. This is done in order to guard against any untoward accident that may happen, by suddenly removing the patient from a moderately warm to a comparatively cold medium. In no disorder whatsoever does this precaution about cold-bathing appear more requisite than in the asthma; for, independently of the disordered state of the lungs, the constitution of asthmatics, from the change that has been wrought in it, will not probably bear with impunity such a sudden transition.

After the body is sufficiently prepared according to the foregoing directions, sea-bathing, if the season offer, should be directed, as the re-action after it is more perfect than after fresh water, as it stimulates more

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powerfully

powerfully the vessels of the skin, and thus promotes a glow at the surface, and an increase of the insensible perspiration. But the time usually spent in sea-bathing may not, in general, be of sufficient duration to accomplish a radical cure, and of course prevent a relapse from taking place; so that it will often be necessary to make use of an artificial salt-bath as a succedaneum, which can be resorted to in the winter, and continued during the whole season.

Having thus acquitted myself as well as I was able on the subject of cold-bathing in asthma, before I conclude this Treatise, some apology may appear necessary for recommending so free and extensive an application of this remedy. Those who have not had proper opportunities of making observations on it, may be apt to condemn a practice which, from reasoning *a priori*,
 2 would

would not only appear absurd in itself, but fraught on many occasions with the most imminent danger. However, it is but fair that they should suspend their judgment till the test of experiment enable them to decide with precision. Unwilling to obtrude any remedy on the Public, without the most convincing proofs in its favour, I desire no co-incidence of opinion, no approbation, except what candour will extort from every practitioner who draws his information from the same source that I draw mine.

F I N I S.

My dear Sir
I am very glad to hear
that you are well and hope
that you will continue to be so
for many years to come.
I am very much interested
in the progress of the
cause and hope that you
will continue to be active
in it. I am very much
interested in the progress
of the cause and hope that
you will continue to be active
in it. I am very much
interested in the progress
of the cause and hope that
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OBSERVATIONS

ON

EMPHYSEMA;

OR,

THE DISEASE WHICH ARISES FROM AN EFFUSION
OF AIR INTO THE CAVITY OF THE THORAX, OR
SUBCUTANEOUS CELLULAR MEMBRANE.

BY

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Edinburgh, and Fellow of the Royal Highland Society
of Scotland.

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TO
THE RIGHT HONOURABLE
Sir JAMES PULTENEY, Bart.
SECRETARY AT WAR, &c. &c.

SIR,

*That regard which I have
for the name of PULTENEY, and
the many obligations which I lie
under to the Countess of Bath,
would have been sufficient to have
pointed you out as the only per-
son to whom I could venture to
inscribe these Observations.*

But,

But, Sir, though these are circumstances which I never can forget, and which I shall ever be proud to acknowledge, I had other motives in soliciting the sanction of your name to this little Work: I was anxious for such an opportunity to return YOU my most grateful thanks for the kind interest you have taken in my fate, and to assure you with what sincerity I am,

Sir,

*Your very obedient and
devoted servant,*

Andrew Halliday.

OBSERVATIONS
ON
EMPHYSEMA,
&c. &c.

Authors. Till Doctor Cullen, in his Synopsis Nosologiæ Methodicæ, chose to denominate it Pneumatosiſ, I believe, it was generally known and treated of under the name of *Emphysema*; a term, which as being most general, I have retained. This disease is rather of rare occurrence, it is how-

B

ever

ERRATUM.

P. 144, line 2, for "*cochymata*," read, "*ecchymosis*."

OBSERVATIONS
ON
EMPHYSEMA,
&c. &c.

CHAP. I.

THE disease which forms the subject of the following observations, has received various appellations from the different nosological writers and Authors. Till Doctor Cullen, in his *Synopsis Nosologiæ Methodicæ*, chose to denominate it *Pneumatoxis*, I believe, it was generally known and treated of under the name of *Emphysema*; a term, which as being most general, I have retained. This disease is rather of rare occurrence, it is how-

B

ever

ever attended with a train of symptoms abundantly characteristic, and is of itself sufficiently dangerous, to entitle it to our consideration. As a separate disease it has found a place in every system of nosology, and is treated of by most practical writers, yet the various cases of this disease which are recorded, and which appear to have been considered as curious, have never arrested the attention of any one in particular; and so far as I know, we have but very little on this subject any where. I do not pretend to say, that in submitting these observations to the public, I should add much to what is already known concerning the disease, or that I shall bring forward any thing original respecting the cause or treatment of Emphysema; yet I should hope it may be of some advantage to the student, and useful to the practitioner, to have before him
in

in a small compass, the various opinions which have been entertained respecting this complaint, and the practice which is recommended by eminent men, and which has been adopted in some of the most remarkable cases.

In the history of Emphysema, there are a number of successive symptoms, in general more or less severe, according to the cause of the complaint. In enumerating these symptoms I shall confine myself to a supposed case from an injury of the thorax, and which is indeed by far the most common cause of Emphysema.

Descrip-
tion of Em-
physema as
occurring
from exter-
nal injury.

There is a constant pain of the side which has been injured, and which at first is not encreased even by a very full inspiration, but in no long time there is a very considerable difficulty of breathing, and the patient complains of a

sensation as if cords were drawn across the chest, and of a peculiar tightness at the scrobiculus cordis. If the part where the pain and uneasiness were first felt is now examined, a soft puffy tumor will be observed, so very prominent as to prevent our feeling the ribs which are immediately under it. This tumor encreases very rapidly, and is soon diffused over all the chest, but is particularly conspicuous on the neck, breast, and face. The rapidity with which it now spreads over the whole surface of the body is amazing, and in many places the skin is elevated several inches from the subjacent bones and muscles; when the swelling has become general, the patient feels it extremely difficult to expire, as well as inspire, the motion of the extremities is very much impeded, and when the skin is very much elevated, motion is almost entirely

entirely prevented. The integuments crackle under the hand, the skin is considerably paler than natural, it feels cold, and when struck, sounds like a wet drum; the air is easily pressed from any part, but it returns again immediately when the pressure is removed; the respiration is not only very laborious, but very quick; the patient makes a sudden effort to inspire, and the air, in passing the epiglottis, has a peculiar noise; expiration follows inspiration almost instantaneously, and is performed with a deep sigh, or rather groan. The patient is unable to lie on either side, and feels most ease and breathes best when sitting half erect in bed, the skin and extremities feel very cold; the pulse is sometimes quick and hard, at other times irregular and very full, but is felt with some difficulty; the eyelids are so puffed up that the patient

tient is frequently blind; the features are very much deformed, and the lips assume a purple, or rather livid hue. There is generally a short tickling cough at the commencement of the disease; this encreases with the other symptoms, so as to become almost incessant; the sputa are frothy, and generally have some admixture of blood in them; the tongue is dry, and the patient complains of a constant thirst; the voice becomes very weak, and unless the effused air is speedily evacuated so as to reduce the swelling and pressure, the patient dies from suffocation.

Some of the
more general
causes
of the dis-
ease.

These symptoms so rapid in their progress, and at all times dangerous, I need scarcely observe are owing to an effusion of air into the cellular membrane of the lungs and under the skin: the cause of this effusion shall be more minutely enquired into in another place,

place, at present I may observe that all the cases in which air can escape from the lungs, or is effused into the cellular membrane, may be arranged under one or other of the following heads.

1st. An injury or disease of the pleura pulmonalis, causing a wound or ulceration of that membrane, and thus allowing the air to escape from the lungs, as in oblique external wounds, where the outer opening and that of the pleura costalis have healed or closed up, and in ulcers of the surface of the lungs.

2dly. The pleura pulmonalis and pleura costalis, may be wounded or ulcerated when there is no external opening, as when the ends of fractured ribs penetrate through both into the substance of the lungs, and it is from this

this accident, as shall be afterwards explained, that Emphysema most commonly takes place.

Wounds
penetra-
ting the
thorax.

3dly. The common integuments of the parietes of the thorax, the intercostal muscles, and the pleura costalis, may be wounded while the pleura pulmonalis and lungs remain uninjured, so that the air admitted from without, and collected in the cavity of the thorax, may be pressed into the cellular membrane so as to occasion Emphysema. These accidents may happen on one side of the thorax or on both, but as in all these cases the various effects produced, whether according to the exertions of the patient or other circumstances, depend on mechanical principles, it will be necessary first to consider the manner in which respiration is carried on while the lungs
are

are in a sound state, and then we shall be able to comprehend more clearly, how, in each of these cases of injury, the Emphysema, or effusion of air, takes place.

✕ The lungs in the thorax have often and not unaptly been compared to a bladder in a close pair of bellows, but if we suppose the bellows to be divided into two compartments, and each of these to contain a bladder which mutually communicate with each other, and with the external air by means of a tube which is exactly adapted to the nozzle of the bellows, and which admits the air only into the cavity of the bladders, and not into the space betwixt the bladders and bellows, we shall then have a perfect representation of the mechanical structure of the thorax; the bellows will
represent

10 OBSERVATIONS ON EMPHYSEMA.

represent the thorax divided in the middle by the mediastinum, the bladders will represent the lungs of the right and left sides, and the tube which communicates with the bladders and with the external air, will represent the Trachea; the only thing which is wanting to render this mechanical representation perfect is, that the bladders should exactly fill the bellows, so as to leave no air betwixt them and the bellows.

It is evident that when we lift the handle of the bellows, the bladders will be filled by the external air rushing in through the tube which communicates with both, and that when we depress the handle, that air will be again expelled. This I conceive is exactly the way in which the lungs are filled and emptied in respiration.

The

The cavity of the thorax being enlarged, by the contraction of the diaphragm and intercostal muscles, &c. a comparative vacuum is formed, into which the air rushes through the Trachea, and we perform what is called *inspiration*, whereas by the contraction of the abdominal muscles and relaxation of others, the cavity of the thorax is diminished, and the air is expelled, or we *expire*. †

The bellows and bladders will also serve to illustrate the cases of injury which I have mentioned as giving rise to Emphysema, and first as occasioned by the pleura pulmonalis of one side, being wounded or ulcerated. This case is in many respects the same as if an opening were made in one of the bladders, and which would open a communication with the space betwixt the
the

the bellows and bladder on one side. Now suppose that this takes place while the handle of the bellows is depressed, as soon as the handle is raised, air will rush into the space betwixt the bladder and bellows, and if you keep the handle up for a little the bladder will collapse altogether, and the place which it naturally occupied when distended will now be occupied by the air. If we attempt to force out the air by depressing the handle of the bellows, we shall find that this cannot be done, for there is no direct communication betwixt the bellows and external air; and as the effused air presses equally on all parts of the collapsed bladder, it cannot escape through it.

By the action of the muscles of inspiration the pressure is removed from the surface of the wounded lung, and
the

the air which should have rushed in and distended the lung now passes through the wound, into the space betwixt the pleura pulmonalis and pleura costalis. In the living body the whole of the air inspired will not be thus effused, but as it must pass through the lung it will also at first distend it more or less, according to the size of the opening in the pleura pulmonalis, and this partial dilatation of the wounded lung will always happen while air continues to be inspired on that side. As soon as expiration begins, the general cavity of the thorax being thereby diminished, the effused air will be compressed against the wounded lung, but none of the air which has escaped can re-enter the lung again; because the whole of the air contained in the lung must be forced out, and then the pressure against every part of the collapsed

lapsed lung being equal, will prevent its separating any part so as to make a passage for itself into the Trachea. In this manner fresh air is accumulated in the space betwixt the pleura at every inspiration, while none is allowed to escape during expiration, and the quantity accumulated at last will be equal to that which was received into the other lung during the most powerful inspiration after the accident. As this is supposed in many cases to have proved fatal without the effusion of air proceeding further, those authors who have divided the disease into different species, have denominated this, *Thoracic Emphysema*. I am inclined to think that this accumulation of air, in the cavity of the thorax, is a more frequent occurrence than is generally supposed in cases of diseased lungs, and we can only explain in this way the pressing
down

down of the diaphragm observed in some dissections after an ulceration of the lungs, and the force with which the air escapes when the diaphragm is punctured.

2dly. In the case when an opening exists both in the pleura pulmonalis, and pleura costalis, the same efforts will be produced till the lung has collapsed; but if the patient shall then endeavour to *expire*, that side of the thorax must, notwithstanding all his efforts, continue in a state of distention. The air, however, in general makes a way for itself through the cellular membrane, and as the passage of air into the cavity of the thorax, during inspiration, is easier than the return of that which has been already effused into the cellular membrane, this effusion continues to go on with the rapidity

pidity and symptoms already detailed, while the patient continues to live, and producing what is called *subcutaneous Emphysema*, or what I conceive to be the disease in its most perfect state.

3dly. Emphysema may take place from a wound penetrating the integuments, intercostal muscles, and pleura costalis, while the pleura pulmonalis and lungs remain sound. To render this more intelligible I shall endeavour to illustrate the manner in which the Emphysema happens, by having recourse once more to the bellows and bladders; if we suppose an opening made into the bellows without injuring the contained bladders, it is obvious that, if the access of air by this opening be more free than that by the nozzle or tube which communicates with the bladder, and you raise the handle of the bellows, more air will enter by the opening than

than by the tube, so that the bladder will not rise as formerly. If the opening of the bellows is less than that of the tube, the bladder will notwithstanding be but partially filled, and if you depress the handle of the bellows, the air contained in the bladder, and that betwixt the bladder and bellows, will be emptied in the same proportion to each other, as that in which they were formerly filled. Or if the bladder receives twelve cubic inches by the tube, while the bellows receive only four by the opening, then when the bladder contains six cubic inches of air, the bellows will contain two, and so on. This would continue to go on at each successive raising of the handle of the bellows, were it not for the natural collapse of the bladder from its gravitation.

C

Let

Let us now suppose that we stop the mouth of the tube, while the handle of the bellows is raised, and the bladder partially filled, and that we then attempt to depress the handle. As no air can escape through the tube, that contained betwixt the bladder and the bellows must be first evacuated, while that contained in the bladder of the sound side, will be forced into the bladder of the diseased side, and either distend it, so as to rupture it, or cause it to protrude.

If now we apply these mechanical observations to the case we are considering, it is evident, that if the access of the air be more free by the wound, than by the Trachea, more air will enter during inspiration into the cavity of the thorax, than into the lungs, and that if the access of air be on the contrary less free, then also less air will
enter

enter the thorax than will enter the lungs. In the same proportion, however, as air enters into the lungs or into the cavity of the thorax, it will likewise be expelled from these cavities during expiration. If twelve cubic inches of air enter into the cavity of the thorax, by the wound, and four cubic inches enter the lungs by the Trachea, during inspiration, the same quantities will be expelled at expiration. Air, therefore, would not accumulate in the thorax, did not the lungs always tend to collapse from their natural gravitation. Should, however, the patient, in making an effort to expire, contract the glottis, the air, contained in the lungs of the sound side, meeting with no resistance, will, by the communication of the branches of the Trachea, distend the lungs of the wounded side, so as to cause them to

protrude at the wound. This is often observed when a wound is made, for the sake of experiment, in the thorax of a dog, and has sometimes, without considering the matter, been adduced as a proof that the lungs do not collapse, when an opening is made into the thorax.

Having stated then thus briefly the history of the disease, and endeavoured to explain the manner in which these several injuries give rise to the train of symptoms which characterize *Emphysema*, it might not be improper to inquire a little further into the general effect of wounds penetrating the cavity of the thorax; but this I shall defer, until I come to speak of the various means recommended and practised for the cure of this disease.

OBSERVATIONS
ON THE CAUSES OF
EMPHYSEMA,
&c. &c.

CHAP. II.

HAVING, in the preceding chapter, detailed the various symptoms of *Emphysema*, and enquired into some of the causes of these symptoms, I shall now consider not only the various other causes of this disease, but also the ratio of the several symptoms.

I have already observed, that injuries of the thorax are, by far, the most common cause of the effusion of air
into

into the cellular membrane. The various kinds of injury, however, which may give rise to this affection are, perhaps, innumerable. I shall only mention the following, viz. Cases in which the lungs have been ruptured, from too much distension, or lacerated by the sharp ends of fractured ribs penetrating their substance, by a fracture of the Sternum, or cut by sharp pointed instruments. The disease is also occasioned by Abscesses forming on the surface of the lungs, and bursting into the Sac of the Pleura. And lastly, it has been known to occur without any evident cause, or, as is supposed, from a bad habit of the circulating fluids.

Various
kinds of In-
jury which
give rise to
Emphyse-
ma.

I shall consider each of these causes separately, and endeavour to illustrate each by cases which I have seen, or have been communicated to me, by
some

some of my friends ; and also by extracts from some of the most remarkable cases which have been published.

I once intended to have given the cases when I came to treat of the practice in this disease, but I think the various causes will be better illustrated by relating a case in point, immediately after the cause is mentioned, while a reference can be made to the practice, in any one particular case.

The first cause which I shall mention is, where the lungs are lacerated by the sharp points of fractured ribs penetrating through the pleura and inter-costal muscles. There is no accident which so frequently gives rise to Emphysema as this; for when the cells of the Bronchiæ are wounded in this manner, the inspired air has free egress not only into the cavity of the chest,
but

Cases in which the lungs are torn or lacerated by the sharp points of fractured ribs.

but also into the cellular membrane under the skin, while there is no opening in the skin through which it can escape; and when once it gets admission into the subcutaneous cellular membrane, it soon becomes diffused, from the rapid manner in which it accumulates.

Doctor Alexander Monro, Senior, Professor of Anatomy and Surgery in the University of Edinburgh, for whom I have the highest respect as a philosopher and physician, and feel the most sincere gratitude for his kindness to me while a pupil, has been so kind as to favour me with the two following cases, from his note book; they are briefly detailed, but the disease was perfectly formed in both, and they were both occasioned by accidents, in which the ribs were fractured.

CASE

CASE 1.

Mr. G. father of Dr. M. G. about sixty years of age, fell from horseback, June 7, 1782, on the stump of a tree, and fractured the second, third, and fourth ribs of his left side, near their joinings with their cartilages. A subcutaneous emphysema appeared very soon after the accident. I was called to him with Mr. Ebenezer Clarkson senior, surgeon in Dalkeith. We found the whole left side of the thorax and under part of the neck emphysematous. Breathing laborious. Pulse 96. We let him blood, and not finding that the emphysema, or difficulty of breathing, increased, we made no incision or perforation. For about ten days, a portion of the chest, where the
ribs

ribs were fractured, almost as large as the palm of the hand, sunk in on inspiration, and was pushed out on expiration. By degrees, this part came to be less moveable, and the emphysema gradually disappeared. By the 24th of June, the second and third ribs could be felt, fixed by a bump of callus to the sternum, just behind the hollows that naturally receive them, and in which they play. The fourth rib had a large callus on it. Cathartics were occasionally given to move his bowels, which were much constipated. He had a complete recovery.

CASE 2.

“I was called by Mr. Clarkson, some years thereafter, to a similar case of a man of the name of Johnstone, about fifty years of age, who had two ribs fractured by an iron crow, which fell from a height upon him. In this case, likewise, a subcutaneous emphysema occurred; but he had so little difficulty of breathing, that no operation seemed necessary. It appeared to me, beyond doubt, that there were in both cases, considerable adhesions of the lungs with the pleura, which prevented them from collapsing so much as to occasion great difficulty of breathing.

(Signed) “A. MONRO, Sen.”

The

The disease, in these cases, I think, from what the Doctor has suggested, was prevented, in a great measure, by the adhesions of the lungs with the pleura; for, as the lungs could not collapse, of course the further effusion of air would not so readily take place, while that which was effused might, in some degree, find its way again through the wounds, and be expired by the Trachea. It is then I should suppose, from the frequent and strong adhesions which exist between the lungs and pleura in the greater number of people that Emphysema does not occur so often as might be expected, from accidents, in which the ribs or sternum are fractured.

Some time ago I had the pleasure to receive, from my friend, Mr. James Wardrop, the following letter, in
which

which he has detailed a very remarkable case; and which I should not do justice to was I not to give it in his own words :

CASE 3.

“ Edinburgh, Hanover-street,
May 28, 1808.

“ DEAR SIR,

“ The particulars of the case of Emphysema, and the conclusions I was led to make from the mode of treatment employed, I will transcribe to you from the notes I had taken at the time of the accident.

“ On the 5th instant, a young healthy boy, between five and six years of age, was thrown down before a loaded cart, and the wheel grazed along the right side of the head, and passed obliquely across the thōrax.

“ I saw

“ I saw him six hours after the accident. A considerable quantity of blood had passed from the nose and mouth; the left side of the thorax was puffed up; and there was a prominent tumor formed over the great pectoral muscle. He complained of pain in the head, and all over the trunk, but the pain was particularly severe on the dorsal aspect of the left side of the thorax. The integuments were bruised and discoloured over the vertebral extremities of the fourth and fifth ribs of the same side, and, as well as could be ascertained, one or both of these ribs were fractured. The swelling was soft, elastic, and had the crackling sensation produced from the effusion of air in the cellular membrane; this sensation was also felt over the integuments of the abdomen. The pulse was

was frequent and hard, but the respiration not much affected.

“ Only two ounces of blood could be drawn from the arm, and he vomited an anodyne and purgative medicine, which were given him.

“ The day after the accident, (the 6th May), he vomited every kind of food ; the emphysema extended over the right side of the thorax, and the crepitation was felt over all the abdominal parietes, and on the back part of the neck and shoulders. His restlessness and pain increased, and he slept none during the night.

“ A *double-headed* roller, about eight yards in length, was now applied round the whole chest, with a view of preventing the motion of the ribs during respiration, and of promoting the
absorption

absorption of the effused air. In applying this bandage, great care was taken to make the pressure gradual and uniform, and only to such a degree as the boy could easily bear.

“The bandage had the desired effect, in promoting the absorption of the effused air, for, on the 7th, (the day after it was applied), the general Emphysema was much diminished. The pain and vomiting, however, still continued, and the pulse became full and strong. He was, therefore, bled to five ounces, and ordered a purgative.

“The bandage had become loose, and was again applied, and he allowed it to be rolled much firmer than before; it made such a number of evolutions round the whole thorax, and over the shoulders

shoulders, that the motion of the ribs during respiration was effectually prevented. Immediately afterwards he appeared easier, and although, before this was done, the slightest motion of the trunk made him cry out, and express signs of pain, he could now be moved about in bed with the greatest ease.

“ On the 11th, (six days after the accident), he was so well as to be able to run about the house, and amuse himself as usual ; but the advantage of the bandage was such, that although he could run about when it was applied, yet he felt great pain and difficulty in walking when it was removed.

“ He still continues to wear it, and every day it is taken off and replaced, for whenever it turns loose, and alters

D

its

its place, he becomes uneasy, and is unable to walk upright.

“ However useful the *double-headed* roller may have been in this case, I believe, that if due attention is not paid to the mode of applying such bandages, they will do much more harm than good; for I know of one instance, where a surgeon of eminence applied one in a case of Emphysema, produced from a fracture of the ribs of both sides of the chest, and caused immediate death.

“ An uniform and gradual pressure, regulated by the feelings of the patient, is, in every disease, where bandaging is necessary, the best general rule which can be followed.

“ I remain your faithful and

“ obedient servant,

“ JAMES WARDROP.”

To Dr. Halliday, &c. &c.

I saw this boy in company with Dr. Monro, jun. on the 24th of May. He had no symptoms of the disease, at that time, but even then he could not move unless he was bound up tightly with the bandage. He complained of considerable pain in his side, and only felt perfectly easy when he was upon his knees, with his body bent a little forwards. This, as Dr. Monro observed at the time, is almost always the case in those diseases, in which the lungs are affected: In about ten days after, however, the boy was perfectly well, and able to run about as usual, though more than a month had elapsed before the bandage could be laid aside altogether.

In the Memoirs of the Académie of Sciences, for the year 1713, there is a case related by M. Merry, of Paris, in

which the disease, occurring from the same cause, did not, however, terminate so favourably.

CASE 4.

A poor man, about sixty years of age, was thrown down on the street, by a carriage, the wheel of which went over his chest. On being taken up, and examined, the fourth and fifth ribs of the left side were found to be fractured, but no other injury could be perceived at that time.

In about an hour after the accident, a pretty large Emphysematous tumor was observed over the place where the ribs were fractured. Mr. Merry concludes with saying, that the Emphysema continued to increase for four days, when

when the patient died. On examining the wound after death, Mr. Merry discovered an almost imperceptible opening, between the intercostal muscles, and on laying open the thorax he found a small portion of the pleura pulmonalis torn from the lungs, and adhering to a splinter of one of the broken ribs.

A similar case was communicated by Mr. Leake, to Dr. William Hunter, and is recorded in the third volume of the London Medical Observations and Inquiries.

CASE 5.

John Rigby, an invalid of the garrison of Plymouth, (says Mr. Leake), aged about 60 years, of a healthy constitution, and rather of a lax than rigid fibre, on the 18th of May, 1762, was coming down from the Banquette, when

when his foot gave way, and he fell, with the whole weight of his body, upon the spiked points of the palisades,

Not being able to raise himself from thence, with the assistance of a soldier close by he was taken up, and, with very little help, walked to the hospital. Being sent for, presently after the accident, I found no wound, but a slight scratch made by the point of the palisade, with little or no tension or inflammation; but, on examining the part, one of the ribs of the left side was found fractured, and on pressing gently, a small Emphysematous tumor was perceived upon the part, about the size of a crown piece.

This Mr. Leake goes on to say, contrary to his expectations, increased very rapidly, for by six o'clock in the evening

ing it had spread itself over both breasts all along the left side, backward to the spine, down as low as the scrotum and ilium, all along the neck and face, particularly on the side on which he had lain, so that the right eye-lids were much inflated, and the eye entirely closed up.

Though this patient continued very ill for some time, he had a complete recovery, which was not, however, the event in the following case which occurred to Mr. Cheston;

CASE 6.

A poor man received a violent contusion on the side, from the shaft of a waggon. An Emphysema came on, which could not be subdued; the patient's strength sunk rapidly, and he died on the third day after the accident.

On

On examining the thorax after death, Mr. Cheston found the second and third ribs, reckoning from below upwards, fractured obliquely, so as to form very sharp points, within two fingers breadth of their junction with the Vertebrae. There was an aperture through the intercostal muscles and pleura, that could readily admit the finger to pass into the cavity of the thorax, and in the lungs there appeared a wound corresponding exactly to the fracture of the ribs.

I might detail several other cases, which have occurred from the same cause, but, I presume, I have related a sufficient number to convince any one that it is a frequent consequence of such accidents, and sometimes a fatal disease.

2dly. This disease has been known to

to occur from a fracture of the sternum or breast bone, but this accident is so connected with the last mentioned, that it is difficult to distinguish betwixt them.

A fracture of the Sternum sometimes a cause of Emphysema.

I cannot, however, omit a case which is related by Dr. Russell, in the third volume of the London Medical Observations and Inquiries, and which is mentioned by the Doctor as occurring from this cause.

CASE 7.

An old man, of the name of Robert Haynes, was admitted into the cutting ward of St. Thomas's Hospital, with a fractured breast bone, clavicle, and arm, on the third of July, 1760. On the day after admission, his head, face, and the whole trunk of the body became Emphysematous to a very great degree, and the scrotum was distended

distended much larger than a child's head.

Though this case is mentioned, particularly by Dr. Russell, as occurring from a fracture of the *sternum*, it may be considered as doubtful; for not only the *sternum*, but also the clavicle and arm were fractured; it is, therefore, more than probable that some of the ribs were fractured and had penetrated the lungs, or that some of the sharp points of the fractured clavicle had wounded the coats of the Trachea.

Wounds of
the thorax
a cause of
Emphyse-
ma.

3dly. The disease has been known to occur from sharp pointed or cutting instruments penetrating into the cavity of the thorax. And as many are exposed to accidents of this kind, I was at considerable pains to ascertain, whether or not wounds of the thorax were a common cause of Emphysema. After a considerable

a considerable deal of search and reading, I have only been able to find *one* case, in which the disease occurred from a wound of this nature, it is recorded by Mons. Littre, in the Memoirs of the Royal Academy of Sciences, for 1739—

CASE 8.

A young man received a wound in the thorax by a small sword, which penetrated into the chest a considerable way. Soon after the accident, a violent Emphysema came on, and the patient died in two days. On dissection, it was observed, that the Emphysematous tumor on the chest measured eleven inches thick. On the belly nine, on the neck six, and four on other parts of the body. The wound in the lungs
was

was seven or eight lines long, one and a half broad, and one deep.

Mr. Hewson endeavoured to produce artificial Emphysema, by cutting and wounding the lungs of rabbits and dogs in various ways; yet all his experiments were unsuccessful. No air was effused either into the cavity of the thorax, or into the cellular membrane. From his experiments, as well as various others which I shall mention when I come to treat of the practice, I am inclined to believe that this disease rarely happens from sharp pointed instruments, or leaden bullets penetrating the thorax and lungs, though Mr. John Bell mentions it as very frequent, after such accidents. I have known one or two instances, where a musquet ball has passed completely through the chest without producing any very alarming symptoms.

4thly,

4thly. Emphysema has been known to occur, from the lungs being ruptured by over distension, or, in other words, from the rarefaction, I suppose, of the inspired air, during a violent exertion or straining, the cells of the Bronchiæ have burst, and the air has escaped into the cellular membrane, and so occasioned this disease. When about to exert ourselves in any manner either in lifting a weight, or in giving a blow, our first act is to inspire a considerable quantity of air, and the fullness of the inspiration bears some proportion to the violence of the exertion. During the continuance of that exertion we continue to retain the air in the chest. The same action takes place in crying from pain, or in violent coughing. Now, it is evident, that unless the ribs and parietes of the thorax resisted the over distension of the lungs

The lungs
have been
ruptured
by over
distension.

lungs, that they would be frequently in danger of being ruptured from this cause, and so allowing the air to escape into the cellular membrane, produce Emphysema.

The following case, which it is evident arose from a rupture of the lungs or Trachea, by over distension, was communicated by the late Dr. Alexander Hamilton, Professor of Midwifery in the University of Edinburgh, to Doctor Monro, many years ago, and to this distinguished Professor I am indebted for its insertion here.

CASE 9.

A young woman, about seventeen years of age, (says Dr. Hamilton), of a full habit of body, and florid countenance,

nance, while endeavouring to conceal the pains which precede labour, suddenly lost her voice, and in a short time her face became swelled in a wonderful manner. A tumor, which crackled under the hand, was quickly diffused over the whole head, neck, and thorax. Her eyes were completely shut, and the features of her face very much deformed. Her respiration was quick and laborious, pulse full and quick. She complained of no particular pain or uneasiness, but her mind was anxious, and she was very much frightened about what had happened to her. When I was called to her, I ordered a vein to be opened, and took away a considerable quantity of blood in a full stream; I also directed the tumid parts to be rubbed with Ol. Camphorat : twice in the day. For about a week the belly was kept open
with

with laxative medicines, and she took an opiate at bed time.

During this time, the swelling began to give way, and in proportion as the Emphysema disappeared, she recovered her voice. About three weeks after delivery she left her lodging, and went to another part of the town. I saw no more of her for two months, when she accidentally came in my way, and even then the Emphysema could be perceived on her neck and breast; for when pressed, the crackling noise was still very distinct. Her features were quite natural, however, and she enjoyed perfect good health.

Another case, which appears to have occurred from this cause, is related at considerable length, by Mr. Kelly, of Leith, in the second volume of the
Edinburgh

Edinburgh Medical and Philosophical Commentaries. I hope I shall be excused for giving it in Mr. Kelly's words, as I shall have occasion to refer particularly to it hereafter.

CASE 10.

“A man, about fifty-seven years of age, who had for several years laboured under a cough, attended with difficulty of breathing, on the morning of the 1st of April, 1769, was suddenly awakened with a severe fit of coughing, violent pain in his side, and great difficulty in breathing. The pain was fixed to one place, between the seventh and eighth ribs. It was much increased by his cough, which at the same time became more frequent. A surgeon in the neighbourhood was immediately

E mediately

mediately sent for, who blooded him and gave him a pectoral decoction. As he was not relieved, the bleeding was repeated in the forenoon, and a blister applied to the place in which he complained of the fixed pain. In the evening of that day, I was desired to visit him, when I found him affected with the symptoms mentioned above. His pulse beat between seventy and eighty strokes in a minute; and the blood which had been last taken from him was not in the least sizzly. I ordered him a solution of gum ammoniac, and a purging clyster, as he had been costive for some days.

“ On the second he still continued as before, nothing relieved by the bleeding, blistering, or clyster. His pulse was soft, and not quicker than natural. In the night he accidentally
observed

observed his scrotum much swelled, but without pain. Next morning, upon a careful examination, the whole right side was found covered with an Emphysematous swelling, which yielded to the touch, but kept no impression. Wherever it was pressed, it gave a crackling noise.

“ When I saw him on the 4th, the swelling had increased over his whole body. It extended also to his arms, hands, and neck, as high as the angle of the lower jaw. I directed that his whole body should be rubbed with flannel cloths and camphorated oil; and, as he was still costive, I ordered him a bolus of jalap and calomel.

“ On the 5th, the bolus operated well, but the swelling still continued, and was attended with great oppression

in his breathing. The scrotum appeared to be more flaccid, but the penis itself was much enlarged. Upon mentioning this case to Dr. Monro, his advice was that the side should be accurately examined, with a view of discovering at what part the air got into the cellular membrane. If the place could be discovered, he proposed that an incision should there be made through the skin; and if that afforded no relief, or did not evacuate the air, that a perforation should be made into the thorax by means of a trocar.

“ His side was carefully examined on the 6th; but it was impossible to discover from what part the air got into the cellular membrane. The pain of which he complained had shifted lower down, and farther back, than it was at first. As his difficulty of breathing, however,

however, was much increased, Doctor
Monro proposed that an incision should
be made at the part where he was first
affected with the pain. This was ac-
cordingly done, about the middle of
the thorax, between the seventh and
eighth ribs. His breathing, however,
was not in any degree relieved, nor
was any air discharged, unless upon
rubbing towards the opening. A per-
foration was therefore made into the
thorax, obliquely, between the ribs.
Upon withdrawing the perforator, such
a blast of air issued through the canula,
as to blow out a lighted candle, three
or four times. Immediately upon this,
from being before in the most misera-
ble situation, he became easy, and al-
most totally free from his oppression.
His pulse, which, before the operation,
beat above an hundred strokes in the
minute, soon fell to ninety. A cork

was

was put into the canula, which was left in the opening, and tied with a string round his body. On a violent fit of coughing, however, with which he was seized in the night, it came out but it was again introduced next morning.

“As his difficulty of breathing was very inconsiderable after the first perforation, the canula was withdrawn altogether on the afternoon of the 7th. At that time several incisions were made into the cellular membrane, in different parts of his body. Through these the air puffed out, when a pressure was made towards them, but not otherwise.

“From the 8th to the 14th, his breathing continued easy, and the swelling gradually abated. He was, however,

however, greatly distressed with his cough, particularly when in a recumbent posture, which obliged him to sleep in a chair for some nights. On the 15th, the frequency of the cough excited such a pain in his side, as to render bleeding necessary. His blood appeared very sily ; and next day the pain in his side was much abated. He then got an infusion of senna with tamarinds, by way of purgative, which operated well.

“ On the 17th he was much easier, although he durst not lie in bed during the night. He walked through the house, but complained, at times, of a pain in his side, at the place where the operation was performed. He imagined, also, that there was sometimes a rising of the skin there in a lump; but this I could not perceive, although
I held

I held my hand upon it for a considerable time, and made him put himself in all the different positions which he thought occasioned the swelling. Next night he ventured to go to bed, and slept easily for some hours. From this time he continued to recover; and, by the 30th, excepting weakness, he was free from all complaints. His cough was even easier than before he was attacked on the 1st of April; and he ate and slept as well as he had done at any time for thirty years before."

These are by far the most common cases of injury, which give rise to that complaint which forms the subject of our present enquiry. They may, however, be complicated in various ways. And indeed, there may be many other *kinds* of injury which occasion Emphysema, though I have not been able to
meet

meet with any but such as were of the nature of those now detailed. Cullen mentions Hysteria as one of the causes; but should the disease occur during or after an Hystericparoxysm, I imagine it must be referred to the last mentioned species, namely, as occurring from a rupture of the lungs, by their being over distended.

I recollect seeing it some where mentioned, that Boerhaave had seen a case of Emphysema, which was caused by a wound in the scalp of a boy. Dr. Cullen, if I understand him right, gives it as his opinion, that Emphysema is, in most cases, occasioned by the external air getting into the cellular membrane, through wounds in the integuments; but this, in my opinion, can never happen.

If we consider for a moment, we must be convinced that when a wound is
made

made on any part of the surface of the body, so as to admit of a free communication between the external air, and the subcutaneous cellular membrane, there is no vacuum formed, to admit of the air's passing into the cells of that membrane. The pressure of the air on the sides of the wound, and, indeed, on the whole surface of the body, must be equal to that in the wound; therefore I should think it impossible either for it to penetrate into the membrane, or to accumulate under the skin in this way.

I have heard, too, of butchers introducing a pipe into wounds, and causing an artificial Emphysema in boys, by blowing them up as they do their meat, to make it look better; but, I should hope, if such a brutal custom
ever

ever existed, that it has been laid aside long ago.

Having considered, then, the various kinds of accidents which occasion an effusion of air into the cellular membrane, and so give rise to Emphysema, I shall proceed, in the next chapter, to consider some of those diseases which have been found to give rise to this affection.

OBSERVATIONS

ON THE CAUSES OF

EMPHYSEMA,

&c. &c.

CHAP. III.

HAVING confined myself, in the last chapter, to the consideration of those accidents which most frequently produce the disease in question, I shall now proceed to mention those *Diseases* which have been observed to produce Emphysema.

Affections
of the chest
the only dis-
eases which
produce
Emphyse-
ma.

The diseases which give rise to this complaint, are neither so many nor so varied as the accidents, and may be com-
prehended.

prehended, with some propriety, under one general term, viz. local affections of the Chest.—It may be produced in consequence of pneumonic inflammation. And it may occur in phthisis; but the most common affections from which it has occurred have been those in which abscess has formed either in the substance or on the surface of the lungs.

As vomicae and ulcerations of the surface of the lungs are attended with erosion and destruction of the bronchial cells, we should naturally expect they would also be attended with an effusion of air into the cavity of the chest. But when we consider that by the inflammation which precedes the formation of pus, the vesicles are condensed, and that adhesions are formed not only with each other, but with the inside of the parietes of the thorax, we must perceive

Abscess not
so common
a cause as
might be
supposed.

perceive that if air is effused, it will be limited for a time to the small sac which contains the purulent matter.— Mr. Heweson mentions, that his friend, Dr. Stark, had shewn him a case in which several large branches of the Trachea were eroded by matter, so as to admit of the air passing freely into the vomica.

When an abscess forms in a part where there is an adhesion, either previously existing, or occasioned by the inflammation which preceded the formation of the abscess between the pleura pulmonalis and pleura costalis, it not unfrequently happens, that both the intercostal muscles and ribs lying over the abscess are completely destroyed. In such cases, if any communication exists between the air vesicles and the vomica, Emphysema must take place,
as

as there is then a free communication between the air cells of the lungs and the subcutaneous cellular membrane. But even in cases of abscess of the lungs where no adhesion existed between the pleura and parietes of the thorax, Emphysema has been known to occur when the abscess burst, and the pus was discharged into the cavity of the thorax.—Here it is evident, the air must be effused first into the cavity of the chest, and occasion that species of the disease which some have termed Thoracic Emphysema, and be accompanied with those alarming symptoms which are observed when water or pus are collected in the thorax, and then, from the violent exertion of the patient to fill the diseased lung, the air is forced through the pleura costalis, and intercostal muscles, into the cellular membrane, and so diffused. I am inclined

to

to think that the effusion of air into the cavity of the thorax is a more frequent occurrence, when the lungs are diseased, than is commonly imagined, though the production of Emphysema without adhesion seldom happens.

The following very interesting case of this kind occurred while I had the honor of acting as Doctor James Hamilton's Assistant in the Royal Infirmary of Edinburgh:

CASE 11.

Remarkable Case of
J. Hay.

James Hay, aged 25 years, a private in the Royal Artillery, stationed at Leith Fort, was brought to the Hospital about five o'clock in the afternoon of ——— 25th of May, 1805. I saw him about an hour after his admission

sion, and noted down the following symptoms, which I have been permitted to transcribe from the Journal. He complained of very severe head-ach, vertigo, with nausea, and general pains; he had a slight cough, which excited some pain, about the superior part of the sternum, and he complained of a very painful feeling of fullness, at the Scrobiculus cordis, and which he attributed to having eaten a great quantity of hard dry cheese for his supper the night before.—His pulse was about 90, and very regular; his tongue was somewhat white, and his respiration rather laborious:—his face was flushed, and his eyes suffused, but his heat was nearly natural. He said he had felt unwell for some days, but that it was only in the afternoon of the 24th that he was seized with rigors and severe head-ache, to which, in the

F

course

course of the night his other symptoms had supervened. He was very anxious for an emetic, which, at his earnest entreaty, was ordered for him.

On the 26th the head-ach and vertigo were considerably abated, as was also the pain at the superior part of the sternum. But early in the morning he began to complain of great difficulty in respiring. I was called to him in a great hurry, and found him almost suffocating; I took about twenty ounces of blood from his arm, which produced a little relief—I found that the Ipecacuanha which was ordered the evening before, had not produced vomiting, but that in the course of the night he had had two loose motions.— At twelve o'clock, when Dr. Hamilton came to the Hospital, I carried him to this patient immediately; the difficulty

culty of breathing had become even more severe, his face was turgid, and his lips quite livid. On the Doctor's examining him attentively, he discovered not only an unusual fulness of the face, but also of the neck and breast, and when he pressed upon these parts with his hand, there was evidently a crackling noise. In about half an hour after Dr. Hamilton had made these observations he returned again to the patient. The fullness or tumor was become not only more evident, but was diffused all over the chest, and down both arms. The crackling noise on pressure was also much more distinct. He had now the greatest difficulty in respiring at all, and before one o'clock every part of the surface of his body was become emphysematous, except the palms of his hands, and the soles of his feet.

F 2 A consultation.

A consultation of the surgeons was requested by Dr. Hamilton, and as the patient appeared evidently moribund, it was agreed that the only remaining hope was to perforate the the thorax, not that they had even much to expect from the operation, yet it appeared the only manner in which his life could be saved.

An incision was accordingly made by Dr. Inglis, about half an inch in length, through the integuments, between the sixth and seventh ribs on the left side of the thorax. The intercostal muscles were then carefully dissected, and a small opening made with the point of the scalpel through the pleura-costalis, into which a small flat silver canula was introduced.

As soon as the opening was made
into

into the cavity of the thorax, every distressing symptom became more severe, and the patient scarcely survived a quarter of an hour. The body was opened by my friend Mr. George Bell, who was so very obliging as to favour me with the following accurate detail of the appearances on dissection.

Air was found effused into the cellular membrane under the skin on every part of the surface of the body, except on the back part of the head, the palms of the hands, and soles of the feet. This effusion was greatest on the thorax and trunk, and least observable on the extremities:—the lungs on the left side were sound, nor indeed were there any marks of disease in the left cavity of the thorax, except that towards the spine, the pleura costalis shewed some slight marks of inflammation

Mr. Bell's
Account of
the appearances on
dissection.

mation and where some of the small cells were very much distended with air.

The opening between the sixth and seventh ribs, and about half way between the sternum and spine, which was made while the patient was alive, with the view of evacuating the confined air from the sac of the pleura, appeared to be about half an inch in length, as the surgeon intended it.—The mediastinum appeared rather of a looser texture than natural, and seemed as if it had been very much stretched, as did also the pericardium and surrounding parts.

There were about six ounces of serous fluid in the pericardium, the surface of which was also in a considerable degree emphysematous, the right ventricle of the heart appeared to have been

been very much inflamed, for more than a third part of it was covered with coagulated lymph, in some parts much thicker than the substance of the heart.

The lungs of the right side were completely collapsed, at least very little air could be observed in the bronchial cells, near the middle of the anterior surface of the upper lobe there was a vomica of about three inches in circumference, from which it appeared that about four ounces of pus had very lately escaped into the sac of the pleura through an opening which would scarcely admit the head of a small silver probe; upon blowing into the trachea it was observed that the air passed freely through this opening into the sac of the pleura; from this, too, it was easy to discover the size of
the

the vomica, and the very free communication which there was betwixt the air cells of the lungs and the cavity of the thorax.

The other lobes of the lungs on the right side were perfectly sound. Some of the bronchial glands were very much enlarged; three or four of them were even about the size of a chesnut.

The pleura costalis of both sides of the thorax shewed evident marks of inflammation in many parts, particularly towards the spine, and also where the mediastinum is joined to the sternum.

While examining with some attention and endeavouring to discover the opening through which the air had escaped from the cavity of the thorax, a small part of the pleura costalis, between

tween the sixth and eighth ribs, and about three inches from the vertebræ was discovered, with the appearance of being more inflamed than any other part, and nearly in the centre of this small spot an opening was detected, through which the pleura and cellular membrane were easily inflated.

In addition to these circumstances, I learnt afterwards from this patient's sister that, about three months previous to his coming into the Hospital, he was at a country fair, where he got considerably intoxicated with spirits; and on his way home, lay down by the road side and fell asleep. That, in consequence of this, he had a very severe attack of pneumonia, for which he was repeatedly bled, and from which he recovered very slowly. He had complained for several weeks of
difficulty

difficulty of breathing; and on the evening before he was attacked with the complaint for which he was sent to the Hospital, he had been using violent exercise with a large forge hammer.

Cases such as this, I have already observed, can seldom happen, as in most instances the patient will die of suffocation before the air can find a passage into the cellular membrane.—

M. Meckel's Case somewhat similar to that of Jas. Hay.

Professor Meckel, of Berlin, in the History of the Royal Academy of that City for the year 1759, has given a very remarkable case of a soldier, which, as illustrating, not only the distressing symptoms which air occasions, when effused and contained within the thorax, but as showing also the length of time this effusion can exist without producing subcutaneous Emphysema, I shall beg leave to relate in the
Professor's

Professor's own words—as I deemed it interesting, I have made a pretty full extract :

CASE 12.

“ Le 18 Janvier de l'année dernière, dans notre Hôpital de la Charité, mourut un jeune Soldat, nomme Herzog. Il étoit dans sa dixhuitième année ; son corps étoit musculeux et bien constitué ; et sa stature alloit à cinq pieds et onze pouces. Pendant les dix jours qu'il passa dans cet Hôpital, il se plaignit d'une extrême anxiété et difficulté de respirer, ne pouvant le faire que quand il étoit à son séant dans le lit. Son pouls étoit fréquent ; mais il n'expectoroit point de pus, sa toux n'étant même, ni continuelle, ni phtysique. La saignée ne lui procura aucun soulagement ;

lagement ; et il en fut de même de tous les remèdes qu'il prit : au contraire, la difficulté de respirer allant toujours en augmentant, il y succomba et mourut. Avant que d'entrer à l'Hôpital, il avoit passé dix-sept semaines au lit, se plaignant toujours de la respiration difficile, mais ne pouvant indiquer aucune cause de son mal.

“ Je disséquai son cadavre. Ayant ouvert l'abdomen, je trouvai le foye dans un état de dépression, étant placé au dessous des cartilages des côtes de l'hypocondre droit, et même obliquement, en sorte qu'il étoit plus élevé du côté gauche, et plus enfoncé vers le bas dans le côté droit. Le diaphragme convexe par embas s'avancoit dans le côté droit dans la cavité de l'abdomen, au dessus du lobe droit du foye, de manière qu'il paroissoit gonflé comme une vessie au dessous des cartilages des côtes

côtes septieme, huitieme, et neuvieme. Par cette raison, le foye dans ce côté étoit déprimé au dessous de l'hypocondre, son lobe droit s'enfoncant dans la cavité de l'os droit des iles ; il étoit placé sur l'intestin cœcum, la premiere courbure du colon étant déprimée dans la region de l'os des iles, au dessous du lobe droit du foye. De se côté droit le colon passoit à la crête de l'os des iles du côté gauche, sous la grande courbure du ventricule qui s'enfonçoit dans le côté droit ; puis il remontoit derriere le ventricule dans l'hypocondre gauche jusqu'à la ratte ; d'où, faisant une courbure fort aigue, il descendoit suivant son cours naturel devant le rein droit. Je soupconnois que, comme il arrive souvent, la cause de ce phénomène se trouveroit dans du pus, ou de l'eau répandue dans la cavité du thorax, surtout voyant que le diaphragme
pressé

pressé en arriere s'avançoit vers l'abdomen avec l'apparence d'une vessie pleine d'eau. Mais quelle ne fut pas ma surprise quand, après l'ouverture du diaphragme, il sortit avec bruit de l'air du thorax par la playe faite au diaphragme, qui, de gonflé qu'il étoit auparavant par embas, se releva vers le thorax et se relâcha ! Dans la cavité même du thorax, à droite, au dessus du diaphragme, jusqu'à la troisieme côté, il y avoit un vuide que le pöumon ne remplissoit pas, mais qui étoit dégagé, sec, et garni partout de la pleure blanchâtre, et seulement un peu plus épaisse qu'elle n'a contume de l'être naturellement ; une mucosité déliée y étant repandue par dessus."

There

There is another case, related by ^{The Case as related by Palfyn, by no means un-} Professor Palfyn, in his *Anatomie Chirurgicale*, in the section *De Scroto*, which occurred from an abscess formed on the surface of the lungs ; but, in this instance, the pleura had adhered to the parietes of the thorax ; and it would appear that the intercostal muscles and ribs had been completely destroyed. The following is a translation of a short extract from the case, as related by Palfyn, p. 142 of his work :—

CASE 13.

I was requested (says he) by the surgeon of the British Military Hospital, which, during the war, was at GAND, to be present at a consultation on the case of a soldier, about forty years of age, whose scrotum was immensely

mensely swelled, and who had also a considerable swelling all over the abdomen and breast. I also observed, that when the patient filled the chest as much as he could by inspiring fully, that there was a tumor about the size of a pullet's egg started up betwixt the second and third true ribs, reckoning from above, on the left side of the thorax, and that when he expired fully, this tumor disappeared.

“ I directed the surgeon to make several small incisions in the scrotum and other swelled parts; and, observing the air to rush out with some force, I was satisfied it was a case of Emphysema.

“ I was anxious to know if he had had any disease in the chest, and accordingly upon questioning him, found
that

that he had coughed up a great quantity of purulent matter, apparently from an abscess."—Having learnt these things, Palfyn gives it as his opinion, that the air when drawn into the lungs during inspiration, passed immediately through the cavity of the abscess which had been formerly occupied with pus, into the cellular membrane, under the skin, and in this way produced the general Emphysema.

I consider this case, too, as rather uncommon, but by no means so much so, as Cases 11 and 12 : the free communication which is formed between the cells of the lungs and subcutaneous cellular membrane, permits the inspired air to pass, in the same manner as if the parietes of the thorax had been cut or lacerated. But in such cases it is evident the patient will

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always

always be able to breathe with more freedom than in those cases which occur from injuries, and where there is no adhesion : for here the lungs are prevented from collapsing, therefore, no very great difficulty of breathing can exist, at least for some time, and, of course, the symptoms will be less urgent, and the complaint subdued with more certainty ; but of this I shall speak more at large, when I come to consider the practice in this disease.

OBSERVATIONS

ON THE CAUSES OF

EMPHYSEMA,

8c. 8c.

CHAP. IV.

HITHERTO we have found no difficulty in accounting for the occurrence of Emphysema; for whether arising from accident or previous disease it was evident that the effusion of air which was the cause, or indeed, constituted the complaint, proceeded from the ruptured or injured cells of the lungs.

Spontaneous Emphysema not so easily accounted for as that arising from Accidents, &c.

There remains, however, still to be mentioned a more singular kind of this

G 2

disease;

disease ; which, as arising from no very evident cause, has been denominated *Spontaneous Emphysema*. And of which the following case, as related by the justly celebrated Dr. Baillie, in the first volume of the Transactions of the Medical Society of London, forms a striking example :—

CASE 14.

Singular
Case by
Dr. Baillie.

“ I had lately (says Dr. Baillie) an opportunity of observing a very uncommon appearance of disease in the living body, as well as of examining its extent after death.

“ Margaret Buck, aged about ten years, was admitted, nearly three months ago, a patient into St. George's Hospital, with anasarca and ascites.—

Two

Two days before her death, I was desired by the apothecary of the hospital to see her, as Dr. Ford, the physician, who had for some time attended her, could not come on that day to the hospital. When I saw her lying in bed, her appearance differed in nothing from that of a person highly anasarctous; nor should I have at all suspected that there was any peculiarity in her complaint. Upon attempting to feel her pulse, however, I was surprised by the crackling of air under my fingers, and the skin was considerably elevated, so that the pulse by that means was indistinctly felt. I then pressed upon the skin of the back, breast, belly, &c. and there was the same crackling of air. Air was also felt in the cellular membrane of the inside of the thighs. There was at the same time a considerable quantity of

of water accumulated in the cellular membrane of the legs and face, as could be readily distinguished by the doughy feeling upon pressure. The girl herself lay in a sort of stupid state, expressing, however, a sense of considerable pain, and having a good deal of difficulty in breathing.

“After having examined the patient, I sent for Mr. Walker, one of the surgeons of the hospital, who was at that time in the house, that he might have an opportunity of seeing this very curious appearance of disease, and desired that small openings might be made through the skin for emptying the air. The patient died on the next day, and I took an early opportunity of examining the full extent of the disease by dissection.

“ Air was found diffused through
the

the cellular membrane of the trunk, arms, thighs, &c. as formerly related. Upon making an opening into the cavity of the abdomen, the stomach was found distended, almost as far as it could stretch, with air, and the whole intestinal canal was moderately filled with it. The air too had penetrated into some parts of the cellular membrane of the stomach and intestines. The laminæ of the peritoneum, composing the mesentery, were separated at some distance from each other by the air which occupied its cellular membrane, and the small vessels running upon the stomach and intestines were universally filled with it. There was about a gallon of water in the cavity of the abdomen.

“ Upon opening into the cavity of the chest, a great quantity of air was found

found in the cellular membrane between the pleura and the pericardium, but none could be discovered in the cellular membrane connecting together the air-cells of the lungs. A considerable quantity of water was found in the cavity of the pericardium, and about two pints in the left side of the thorax.

“ What is remarkable in this case is, the collection of air without any external injury in the cellular membrane of any part of the body. Emphysema generally spread over the body has been observed to take place in two ways; the one way is, by air escaping into the cellular membrane of the body, in consequence of the lungs being wounded by a broken rib; the other way is, when air is generated by a putrefactive process, as occasionally happens in mortifications. Neither of these could

could have been the cause of Emphysema in the case which I have related."

Various opinions have been entertained respecting the source of the air in cases such as the one just related, and various theories have been formed to account for the spontaneous occurrence of Emphysema. HUXAM, and along with him most of the authors of the present day, have supposed that the air was generated by a kind of putrefactive process. In a letter, which Dr. Huxam addressed to Mr. Leake, and which is published in the third volume of the London Medical Observations and Inquiries, he relates the following case:—

CASE 15.

About three years ago (says Doctor Huxam) a full bodied, middle aged sailor, Michael M'Cann, of the Moste

Huxam's
opinion of
the causes
of this spe-
cies of the
Disease.

deste man of war, was seized with a putrid fever and sore throat. He *was bled* at the beginning, but his blood appearing in a loose dissolving state he was bled no more. A blister was also applied between his shoulders, which soon dried up.

About the seventh or eighth day of his disease, an *Emphysematous* swelling appeared in his face, neck, and all over his breast, especially on the right side. The skin was greatly stuffed up, and made a crackling noise under the finger when touched, as if you had handled a half-blown dry bladder, and the patient was exceeding stiff, and uneasy with it.

Being called to see the patient, the Doctor goes on to say, I examined it with great care, and found the tumor altogether flatulent, and a complete
Emphysema.

Emphysema. I advised the fomenting of it with sharp vinegar and camphorated spirit of wine. And if that should not succeed, to scarify slightly. The tumor totally vanished, in two or three days, without any scarification, and he soon recovered from the fever."

"Here (he concludes) the Emphysema was generated merely by the putrescence of the humours, as is frequently observed in a less degree in and about the incipient gangrenes of the limbs," &c.

It is indeed certain, as Dr. Huxam also observes, that during the putrefactive process much air is disengaged, both from animal and vegetable matter, yet that this process should go on so far in the living body as to produce general Emphysema, without proving fatal in the first instance, is rather to be questioned.

questioned. There is a very marked difference in the diseases under which the patients laboured, when attacked with Emphysema, and though putrefaction may have had something to do with the generation of the air in Huxam's case, it is evident it could have little or nothing to do with it in the case related by Dr. BAILLIE.

Various
opinions
respecting
the same.

Some of the French authors have supposed that the air, in such cases, was taken up by the blood vessels in the lungs, and conveyed along with the blood to be deposited in the reticular cells of the subcutaneous cellular membrane.*—But it is now well known, that air cannot circulate in the arteries, in an uncombined state, without prov-

* *Memoir de l'Academ. Royal des Sciences, pour l'Ann. 1713—Observat. sur l'Emphysema, par Mon. Lettre.*

ing

ing fatal, and, as is supposed, when it reaches the heart.* This theory, therefore, requires no further refutation. There is another opinion, which I have met with some where, which is, that the air, in such cases, is merely evolved, or, in other words, brought from a fixed to a diffusible nature, by means of heat, putridity, or some other cause. I am inclined, however, to consider this as bordering too much on hypothesis. Various opinions have been formed, by different authors, respecting the kind of air that is accumulated in these cases; and there is no doubt but if this was fully ascertained it would throw considerable

* Ruysh, in his *Epist. Anatom. et Problem* 16, relates the case of a woman who died suddenly. The heart was very much distended, and when opened, a great quantity of air escaped from it.

light on the subject. But I have been able to meet with nothing satisfactory respecting it, further than that it has been ascertained to be incapable of supporting combustion.

The opinion
of the
Author.

I am of opinion, that the air, in cases of spontaneous Emphysema, is generated by a process somewhat similar to putrefaction; not in the solids of the body, but in that *matter* which, while the patient is in health, and the functions are natural, passes off by what is called *perspiration*. And I would explain this in the following manner:—

As it is only in cases of malignant fever, and those diseases in which the circulating fluids are materially changed, and the functions of the body considerably impaired, that this generation of
air

air is observed to occur, I therefore suppose that that matter which should be thrown off by the extreme branches of the arteries, or to use the common language, that fluid which is *perspired* during health, is accumulated under the skin, and here undergoing a chemical change, is separated into its more simple constituent parts, of which azotic gas is, by far, the most abundant,—and that this being diffused through the cellular membrane, produces the windy swelling, or Emphysema.

OBSERVATIONS
ON THE
METHOD OF CURE
IN
EMPHYSEMA.

CHAP. V.

WE come now to what I conceive the most important part of these Observations, namely, the consideration of the various means which have been practised or recommended to be practised, for the cure of Emphysema.

From whatever cause the disease may occur, it is evident that the rapidity

dity of the of the symptoms, and their dangerous tendency, will oblige the practitioner to be prompt in deciding on the practice which he is to adopt for the recovery of his patient. The practice, no doubt, must vary in different cases, yet, as the effusion of air is, in all, the cause of the distressing symptoms, our thoughts will, in the first instance, turn to the consideration of the manner in which we can, with the greatest safety, and least delay, evacuate this fluid.

I propose, in this chapter, to consider, in separate sections, first, the several operations which have been recommended for evacuating the effused air, and lastly, the other parts of the practice and remedies which may be necessary in completing the cure.

SECTION I.

Of Scarification of the Integuments.

THE late Dr. WILLIAM HUNTER was the first, I believe, who pointed out the practice to British surgeons. In a paper which he read to the Medical Society, 1757, and which is published in the second volume of the *Medical Observations and Inquiries*, he details at great length a very severe case of Emphysema, from a fractured rib ; in which this operation was attended with the most beneficial effects.

The Doctor was called to the case, he says, by Mr. Hales, surgeon, at Limehouse. The patient, *Henry Templar*, a young man of a small and slender form of body, was thrown from
his

his horse, and thereby received a considerable hurt in his side, about two o'clock in the afternoon of July 13th, 1754. He complained of much pain in his left side, and difficulty of breathing. When the side was examined by the surgeon, he found so remarkable a swelling under the skin, that he could not trace nor even feel the ribs. This swelling increased fast, and spread itself over the body.—Dr. Hunter says, I visited him with Mr. Hales, about seven o'clock in the evening, (twenty-nine hours after the accident); he was in bed, panting for breath. His form was that of a human skin stuffed: I have often seen such anatomical preparations, and wondered at so much pains being taken to so little purpose; for, till I saw this man, they seemed hardly to resemble any thing human. The inflation was great and universal, ex-

cept in his hands and feet, where it was inconsiderable.

The skin was every where shining, as it is when much distended by any kind of swelling, and, in most places, was raised one, or two, or perhaps, three inches from the subjacent muscles or bone.—The air could easily be pressed out from any part, but it immediately returned upon taking off the hand. When struck, his body sounded like a wet drum, and, when pressed, the air could be felt, and its sound distinctly heard.

The cellular membrane was less inflated, and the skin less distended upon his extremities in proportion nearly to the distance of the part from his chest. Those parts on the surface of the body, which have a more loose and yielding cellular membrane were proportionably

ably more swelled: thence his eye-lids were so fixed by their own bulk, that he had not been able to see light from a few hours after the accident happened. The *penis* and *scrotum* were as much distended as I ever saw them in the worst *anasarca*.

Such is the minute and elegant description, which this celebrated Anatomist gives of this case; he adds, however, many other particulars, not less interesting, but which are common to every case; I shall not, therefore, detain the reader by extracting them, but beg leave to recommend the original paper to his attentive perusal. In this case Dr. Hunter was anxious to ascertain whether or not the cellular membrane of the more internal parts was inflated, and accordingly he examined the patient's mouth, and also the rectum;

tum ; he found all the loose membrane between the tongue and gums inflated but could feel no Emphysema within the *sphincter ani*.

After giving the history of the case, at considerable length, Dr. Hunter goes on to say, that he proposed *opening* the skin below the scapula, with the view of giving immediate relief. This being approved of by Mr. Hales, and consented to by the patient, Mr. Hales made an incision about an inch in length. The air rushed out with noise as from the mouth of a pair of bellows, and the blast continued to be audible for some time, becoming gradually, however, weaker and weaker.

I stroaked (says Dr. Hunter) the skin all round towards the wound, and each time discharged a considerable quantity of air. To make this process
more

more easy, I oiled his skin, and then continued the stroaking, and in a short space of time his bulk was very much diminished. He was sensible of great relief from this, for, from the most desponding state, his spirits were immediately raised.

The Doctor being fatigued from stooping, left off, upon which the patient began to press out the air himself with great eagerness. In order to empty the head, neck, and opposite side sooner, another incision was made upon the right pectoral muscle, from which there was a great discharge of air also, and at the request of the patient a puncture was made in the scrotum, which at the first blast was reduced two thirds of its bulk.

It was agreed that the patient should
be

be well emptied by pressing out the air at the punctures, and then that a thick compress, wet with spirits and vinegar, should be applied to the affected side, and bound as tight as he could bear it, and that he should lie on that side.

This Dr. Hunter says, was ordered rather with a view of preventing, as much as possible, more air getting into the cellular membrane. The wounds were kept open during the night, and his friends continued to press out the air from time to time, but the compress, &c. were not applied till next morning.

When Dr. Hunter saw the patient next day the Emphysema was very much reduced, and he had no unfavourable symptom, so that he conceived he was out of danger; and concludes with saying, that his difficulty of breathing

breathing and cough, with which from time to time he brought up some blood and viscid phlegm, were so troublesome as to require frequent bleeding. He took nitre and pectoral emulsions, then asses milk, and went into the country. The Emphysema was quite gone in a few days; and in about two months he was in all respects well.

I conceive this to be the first case on record, in which puncturing the skin, with the view of evacuating the effused air, was either practised or recommended.

Though Messrs. Merry and Littre of Paris, have detailed cases previous to Dr. Hunter's time; and though they have both treated of the disease at some length, they never even hint at such

an operation being considered advisable. Nay, Mons. Merry goes so far as to say, that he believes incision in the skin would have tended to shorten the life of his patient, while in the next line almost he states, that he believes the patient died from the pressure of the Emphysema on the outside of the chest.

After the publication of Doctor Hunter's paper, we find that puncturing was the common practice, and that sometimes it was of equal benefit, as in the case related by the Doctor. In Mr. Leake's case, which I have detailed, p. 37, of these Observations, this practice was attended with the almost instantaneous relief of the patient. Upon such an unexceptionable authority, says Mr. Leake, (*viz.* the authority of Dr. Hunter), without farther hesitation, a longitudinal

longitudinal incision was made of about an inch and a half above the fracture, where the swelling appeared most prominent. The air immediately rushed out with noise and violence, and even a considerable time afterwards, by stroking and pressing the parts all around towards the opening, continued to pass off with a hissing crackling noise.

The patient was very soon most sensibly relieved by the operation, and could breathe and swallow pretty freely, which he could not do before without pain and difficulty. The same gentle efforts were persevered in for near an hour and a half, by which the swelling in every part was greatly reduced, and the right eye perfectly freed and opened.

This patient was also bandaged ; but

as the swelling increased, as also his cough and restlessness, the bandage was removed, and the air pressed out at the opening which had been made, which again relieved him, and he slept for some hours in a posture between sitting and lying. On the second day after the accident, the further effusion of air seemed to have ceased; that, already effused, began to disappear. He continued to recover rapidly, for, in less than a month, he was able to do duty.

In the case which we have extracted from Mr. CHESTON'S *Pathological Inquiries*,* this operation was also practised, but not with equal success. In that case the sense of suffocation was very great. The patient could not suf-

* See Case 6, page 39.

fer the least bandage or compress upon the chest; and though repeated scarifications were made in various parts of the body, yet he was nothing relieved, for his sense of suffocation, and difficulty of breathing increased; and, on the fourth day after the accident, on inclining his head backward, his breathing became interrupted, he turned wholly insensible, and soon died.

While the communication betwixt the cavity of the thorax and subcutaneous cellular membrane remains open, I conceive this operation will be effectual in relieving the patient, as it will not only relieve the immediate distension, but prevent the further accumulation; yet, I should think there are few cases, in which scarification can alone be depended on; as we may judge from the great number of fatal cases

cases which have been recorded, while practitioners were unacquainted with any other means of relief.

It is a practice which I think ought always to be tried, for, if it should not prove efficacious it is safe, and will in most instances relieve some of the urgent symptoms. There is no danger of that inflammation and gangrene, which so frequently takes place from similar punctures in cases of Anasarca; so that if they do not prove beneficial they are soon healed up again.

I conceive no very particular directions are necessary, with regard to the performance of this operation. The punctures ought to be made where the integuments are most distended, and as near to the part where the injury was received as possible. They should
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be made with the point of a lancet, and penetrate sufficiently deep to reach the cellular membrane. If the tumor is very great, as in Dr. Hunter's case, the air will rush out with considerable violence, and continue to do so for some time. When, however, it ceases to be discharged in this manner, the parts around the punctures should be pressed gently, and stroaked towards the openings.

I would recommend several scarifications to be made wherever the parts are very much inflated, as in the scrotum, thighs, neck, breast, &c. for the effused air will not only disappear sooner, but it will be less painful to the patient than having the air pressed along the whole body, to the punctures which may have been made on the chest, or over the injured part.

SECTION

SECTION II.

Of Paracentesis of the Thorax.

THIS I have no hesitation in saying, is one of those improvements and discoveries in Surgery, which will ever immortalize the name of *Alexander Monro*; for though this operation has been long practised and recommended in cases when it was supposed water or pus were collected in the cavity of the thorax, yet undoubtedly Dr. Monro has the merit of first proposing it in the treatment of Emphysema. Mr. Hewson as well as Mr. Bromfield have severally claimed the merit of this discovery; but I have little doubt in my mind who was the original proposer of it, and it surely is a practise of the greatest moment in Emphysema.

Doctor

Dr. Monro was present with Professor Meckel, at Berlin, and assisted him in dissecting the patient whose case I have detailed, p. 75, &c. and it was from the appearances observed in that case, that he was first led to consider this operation as likely to be of advantage in cases of Emphysema, more particularly when there was great oppression of breathing. He mentioned what occurred to him at that time to Mr. Meckel, and has continued to recommend the practice in his public lectures ever since the year 1760.

This I state from my own knowledge, for I have seen a manuscript copy of the first course of lectures Dr. Monro ever gave; and in them he mentions and recommends the operation of puncturing the thorax, in cases of Emphysema. My friend, Dr. John

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Gordon,

Gordon, of Edinburgh, in a very excellent paper, which he read to the Medical Society, in 1804, on Injuries of the Thorax, observes, that neither Monro nor Hewson have any just claims to this practical improvement, as the propriety of it was pointed out by Mons. Littre, in 1713.

If Dr. Gordon had considered Mons. Littre's observations, he would have seen at once that it was not by evacuating the air that he (M. Littre,) judged the operation would have saved the patient's life, but by discharging a great quantity of purulent bloody matter, which was contained in the sac of the pleura.

Though Mr. Hewson has not the merit of being the first proposer, every practitioner must feel much indebted
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to him for his valuable observations on the subject ; and of which in the further consideration of this operation I shall freely avail myself.

Before proceeding to the discussion of Paracentesis Thorasis as connected with the disease in question, I shall, as formerly mentioned, consider a little more minutely the mechanical effects resulting from the free admission of air into the cavities of the pleura ; a necessary and immediate consequence of all wounds penetrating the chest.

On this subject the most celebrated physiologists are by no means agreed, a circumstance which appears the more surprising, if we consider respiration as is generally done, and as we have endeavoured to explain it in the first chapter of these Observations, a merely

mechanical function. By attending to the laws which regulate the operation of these powers by which the alternate dilatation and contraction is accomplished, we must find an easy explanation of every mechanical derangement which the function of respiration can possibly experience by a perforation into the cavity of the thorax.

These effects have occupied the attention of physicians and philosophers in every age, and we can only ascribe the great diversity of opinion which prevails among them, to the fallacious appearances which presented themselves on experiment ; perhaps, too, to the erroneous idea, that the same effects must result from an opening made into the chest in the living, as are observed to take place in the dead subject.

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The patient dies, says HIPPOCRATES, if, when a large wound is made into the thorax, less air passes into the chest by the mouth than by the wound.—GALEN is more minute : it is a thing, says he, well known, that the inspiration made by the mouth of an animal, must necessarily be diminished by a wound, in proportion to the quantity of air which flows through that wound into the cavity of the thorax. But, of necessity, less air must be *expired* in proportion as less was *inspired* by the mouth, and, as much as the expiration is lessened, so much must the voice become shorter by a necessary consequence.

MAYOW remarks, in his Treatise De Respiratione, that, in slight wounds of the thorax, part of the air enters by the mouth, part by the wound.—

Hence,

Hence, the lungs are only in part distended into that space of the dilated thorax, which has not been occupied by air entering through the wounds.—

SWAMMERDAM's observations are nearly to the same effect, namely, that in large wounds of the thorax, the lungs do not expand, because, says he, the air finds easier access by the wounds than by the mouth. But in smaller wounds part of the air entering by the mouth, and part by the wounds, the lungs are consequently partially extended.

In these few quotations are comprehended nearly the opinions which were universally maintained on this subject, from the days of Hippocrates to the commencement of the last century.— They are evidently the result of accurate observation, and though expressed in general terms, they will be found to be

be fully as correct as the conclusions since deduced by modern physiologists from many, and some very laboured experiments.

Dr. W. Houston appears to have been among the first, who conceived that all wounds penetrating both cavities of the thorax were mortal, and he is the first who had recourse to experiment for a confirmation or refutation of his opinion.

In April 1728, Dr. Houston, with a narrow scalpel made a puncture into each side of the thorax of a small dog. After the operation the dog barked and howled as strongly as it had done before, and gave no signs of an injured respiration. Some of the Assistants from this suspected that the instrument had not been plunged deep enough
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into the cavity of the thorax, but to remove this suspicion, he made two other punctures, and the effects were entirely the same. The voice of the animal continued sound and entire from nine o'clock in the morning till about six in the evening, when he was killed in order to observe what had taken place.

Upon opening the chest, the four wounds of the pleura costalis were easily discovered, and when the lungs were inflated no air escaped from them, although the knife had penetrated almost an inch into their substance.

About the beginning of November, the same year, the Doctor opened the thorax of a middling sized dog, by a large wound on each side, and, on passing his finger into the chest, he
observed

observed the lungs to be collapsed, in such a manner, that the space betwixt them and the pleura costalis was about an inch.

Upon setting the dog at liberty, he immediately got up pretty chearfully and ran about the room, and howled. Being kept for three days, he was so far from losing his voice, that his howling became rather troublesome, and, at length, being let loose, he ran away.

In January, 1729, Dr. Houston was present at the following experiment which was performed by VAN SWIET-EN: A middle-sized dog was tied to a board and his thorax was opened on both sides by a large wound. His voice did not fail, and so far from the lungs collapsing, a lobule of them was pushed out, through each of the wounds.

wounds. When air was blown into the cavities of the chest, it did not seem to injure the respiration of the animal in the least. After it had lived in this manner for about half an hour without any sensible effect on the voice or respiration, the wound on one side of the thorax was enlarged by cutting through the rib, and now appeared, what, at first sight, would seem a paradox; the lungs were contracted, while the breast was dilated, and when the chest was contracted, the lungs were dilated.—The dog survived this operation also.

The simultaneous contraction of the lungs and dilatation of the thorax, which was observed to take place in this last experiment, has been a constant source of deception to those who have repeated Dr. Houston's experiments. The Doctor accounts for it himself in the following

following simple and rational manner :—

It happens entirely from the sudden diminution of the lower part of the cavity of the chest occasioned by the strong convulsive contractions of the abdominal muscles. It appears to me also, probable, that as the wounds were so large and consequently admitted more air to pass into the cavity of the chest, than the animal could inspire by the mouth, during inspiration the external air would rush in by the wounds, and so keep the lungs contracted, while it was dilated, and that during expiration, when the chest was contracted, and consequently great part of the air contained in the sac of the pleura evacuated, the lungs might from the pressure being removed, expand in some degree, and so produce
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the paradoxical appearance, which they describe.

These, and several other experiments were sufficient to convince Houston of the erroneous opinion he had formed, at the same time they seemed to be repugnant to the justly received doctrine of respiration, namely, that the lungs are dilated by the weight of the air entering through the larynx when the pressure is removed from their surface, by the dilatation of the thorax. With the view of removing, or at least doing away in some measure this seeming contradiction he makes use of the following arguments;

Let a wound be made of an aperture double that of the glottis, into each cavity of the thorax. During inspiration air will enter into the thorax, in proportion

portion as it is dilated, but it will not all enter by the glottis, nor through the wounds, but through each of their apertures proportionally, and the quantity which shall enter by the glottis, will be to the quantity which shall enter through the wounds as the aperture of the glottis to the greatest aperture of the wounds, or, in the present case, as one to four. Therefore, the air by which the lungs are now inflated will be one-fifth of the quantity by which they would have been inflated, if the thorax had remained entire.

This reasoning is rather more specious than solid; for, in such a calculation, a great many more things are to be taken into consideration, than the Doctor seems to have been aware of. In the first place, the natural communication betwixt the external air, and
cavity

cavity of the chest, is a canal of considerable length, commencing with the mouth and nostrils, and terminating in the minute subdivisions of the trachea. Few parts of this canal are either equal or permanent in their dimensions. It is at one part dilated, at another contracted, or may vary every moment, with every struggle of the animal.— Surely then, the glottis, which is neither the commencement nor the termination of this canal, but a point, somewhere in its course, cannot, with propriety, be adopted as a point of comparison, or that by which we can calculate with accuracy the proportion of air which may enter by the mouth, or by a wound into the cavity of the thorax.

To illustrate this a little more, let us suppose that an animal, during the
space

space of two minutes, shall inspire forty cubic inches of air, and that now a perforation, whose aperture is half that of the glottis, is made into each side of the thorax. The air which enters by the mouth must meet with considerable obstruction in its passage to the lungs, from the length as well as the irregularity of the passage through which it has to pass; while, on the other hand, the air which enters by the wounds, has a free and easy access to the cavity of the thorax. The entrance of the air by the mouth is also, to a certain extent, opposed by the gravity of the lungs themselves, which must necessarily begin to operate in some degree as soon as a communication is established betwixt the external air and their surface.

At the end, then, of the next two minutes, it will be found that twenty
cubic

cubic inches, the quantity, according to Dr. Houston's calculation, has not entered the lungs by the glottis, and twenty by the wounds, but that, more probably, thirty cubic inches have entered by the wounds, and only ten by the trachea or glottis; that is to say, much more air will have entered by the wounds than by the glottis, in proportion as its entrance by the mouth shall have been opposed by the length of the trachea, and the natural gravitation of the lungs. Therefore, the air by which the lungs are now inflated will be scarcely one-fourth of the quantity by which they would have been inflated had the thorax remained entire.

According to Dr. Houston's opinion also, the whole air which enters the chest, during inspiration, should go out by the same passages through
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which it entered, during the succeeding expiration, so that no accumulation could take place. But to prove that this is erroneous, I trust I have only to refer the reader to p. 19, of these observations. The animal, by a violent exertion may, perhaps, be able to expel the whole of the air from the cavity of the pleura, but, in general, as I have there stated, a portion will remain, and this portion will accumulate at every succeeding inspiration, and so press more and more upon the surface of the lungs.

So far, however, these experiments afford us a proof, that all wounds penetrating the cavity of the thorax, so as to admit air, are not certainly, nor instantly fatal. But they have discovered none of those means by which an animal obviates the inconvenient effects of such wounds.

VAN SWIETEN repeated Dr. Houston's experiments several times, but always with similar results. On making enquiry among some of his friends as to the reason why the animal continued to live and breathe after both sides of the thorax were perforated, these philosophers, it would appear, were of the following opinion, namely : " That if the wounds inflicted had a less aperture than the rimæ of the glottis, then the air, meeting with an easier passage, through the aperture of the glottis than through the wounds, would distend the lungs, &c. and *vice versa*." But that they might be satisfied as to the truth of this opinion, the following experiment was performed :

A large wound was made into the thorax of a dog, on each side, in the middle betwixt two of the ribs, and
tubes

tubes of tin, whose apertures were much larger than the glottis of this animal, were inserted into the wounds. By these means the perforations were kept open—respiration instantly ceased—the voice was lost, and the animal appeared to be dead; but, on stopping the orifices of the tubes with the fingers and strongly pressing and rubbing the abdomen, the animal soon began to breathe again.

Respiration became gradually stronger, and the voice was recovered, but when the tubes were left open as before, respiration ceased, the voice was again lost, and the poor animal expired.

This experiment was repeated several times, and always with the same results.—Hence, VAN SWIETEN con-

ceives, we may reasonably conclude that wounds penetrating both sides of the thorax, and admitting air, are not speedily and certainly fatal, unless their apertures exceed that of the glottis.

It is only by inserting tubes in this manner, and which was originally proposed by Dr. Houston, that we can properly ascertain the effects of wounds of certain dimensions. A puncture or simple incision into the thorax varies in size, with every struggle which the animal makes, and even with the alternate motions of the chest during respiration, so that no experiment can be considered conclusive, in which such tubes have not been employed. Van Swieten's experiment, no doubt, shews the effects of large wounds penetrating the thorax, yet it by no means war-
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rants his conclusions altogether; for since no tubes were employed whose diameters were less, or even equal to that of the glottis, we cannot assume it as a fact, that wounds of such a size would not also have proved speedily mortal.

BREMOND, after having performed a great number of experiments similar to those of Dr. Houston, arrives at a very different conclusion. Observing that in all his experiments the lungs were contracted during the dilatation of the thorax, and apparently dilated during its contraction; he rejects the explanation given by Dr. Houston, and concludes that the lungs have a self-dilating power in themselves; and, that if the dilatation of the chest, and of the lungs is, as it has every appearance of being, viz. simultaneous in a state of health,

health, yet when the chest is perforated, these motions are opposed to each other.

It is unnecessary for me, after the explanation I have already given of this seeming paradox, to point out the inaccuracy of BREMOND's experiments, and the numerous fallacies by which he has so unaccountably permitted himself to be deceived. I would, however, recommend Dr. Whytt's Essays on the Vital and Involuntary Motions to the attention of the reader. Were the lungs possessed of a self-dilating power, such as Bremond has ascribed to them, no wounds of the thorax, of whatever dimensions, could possibly be fatal.

We have the most incontrovertible proof that the dilatations of the lungs and thorax are synchronous in a state
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of health, and surely then, when a perforation is made into the chest, their simultaneous action is much more necessary to obviate the effects resulting from the pressure of the atmosphere, a power which, if permitted to operate, would instantly terminate in the total extinction of respiration.

A few years afterwards HERRISANT on similar grounds, adopted the opinion of Bremond. But he appears in his experiments, which are related in the memoirs of the Academy of Sciences for 1743, to have been, if possible, more grossly deceived than his predecessor.

In Dr. Gordon's very ingenious paper, formerly mentioned, three experiments are detailed, which were performed by his friend, Mr. M'Donald, a young surgeon, whose accuracy of
observation

observation I was well acquainted with, but who, I am sorry to say, died lately at a very early age at Prince of Wales's Island, in the East Indies.

In performing these experiments, Mr. M'Donald seems to have followed Dr. Houston and Van Swieten: but tubes of very different sizes were introduced into the wounds of the thorax; in the different experiments. When tubes of tin about one-fourth of an inch in diameter were introduced, the breathing of the dog became quick, and somewhat laborious, and on introducing a probe into the tubes, the lungs were found to have receded from the pleura costalis about an inch. After these tubes had been retained in the punctures for about four minutes without producing much inconvenience; they were removed, and the openings enlarged,

enlarged, and other tubes introduced, whose conjoined areas were about double that of the glottis. The respiration became now very laborious. The animal struggled violently, and in a few minutes appeared as if dead. On closing up the wounds, however, and applying friction to the chest, respiration returned, and in ten minutes he was able to walk about.

On the fifth day after performing this experiment, the dog was killed, but nothing particular was observed on dissection, excepting a slight degree of inflammation on the surface of the lungs, opposite the wound on the left side.

The same experiment was performed on a dog of a small size. On introducing the larger tubes, the animal struggled violently for about a minute, and then expired. In one instance, although

though the lungs were immediately collapsed, the motions of the heart and diaphragm continued for four and a half minutes.

From all these experiments then, it is evident that the same effects will take place when an opening is made into both cavities of the chest, as happens when a perforation is made into one, only in a more violent degree, and with the certainty of proving fatal.

These effects I have already detailed and explained in the first chapter of these observations, and shall now only observe, from the manner in which the air goes on to accumulate, the patient must, sooner or later, be suffocated, if the punctures are allowed to remain open.

Experiment

Experiment has taught us, however, that in small perforations of the thorax an animal may obviate the fatal effects by a strong contraction of the thorax, the glottis being previously closed; the air being confined within the lungs, they are rendered incompressible, while at the same time the thorax contracting on the air, existing between the pleura, it is expelled through the wounds, which if then closed, further accumulation will be prevented.

Having ascertained that such are the effects of wounds penetrating the cavity of the chest, we can enter with greater confidence on the consideration of *Paracentesis Thoracis*, as a remedy in cases of Emphysema.

It is evident that in all those cases of Emphysema which happen from a rupture of the lungs, or where they have

have been cut or lacerated by the sharp points of fractured ribs penetrating their substance, an accumulation of air must take place in that side of the chest which has been injured ; and that this accumulation, by pressing upon the injured lung, must produce very distressing symptoms ; as is the case when water or pus is collected in the sac of the pleura.

If the effusion of air has been occasioned by a fractured rib, the air will, in most cases, find a ready communication with the subcutaneous cellular membrane, and so long as this communication remains open, nothing further than scarification will be necessary.— But even in such cases the opening through which the air passes into the cellular membrane is apt to become interrupted ; and in cases, such as the
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one detailed by M. Meckle, where the disease was fatal before it became diffused, and that of James Hay, &c. where at first there was no communication, it is only by performing this operation that he can expect to save the patient's life.

That it has been attended with the happiest effects is already clearly proved. When Monro first suggested it, and Hewson wrote upon the operation, it was only from analogy that they reasoned, but now we can refer to facts. Under the direction of Dr. Monro this operation was performed by Mr. Kelly, of Leith, and the benefits resulting from it are detailed with great accuracy, in the case which I have extracted at considerable length, p. 49, &c.

Mr. Hewson says, that as in such
cases

cases as he had had an opportunity of consulting, no air had been actually discovered in the cavity of the thorax, it might, therefore, be doubted whether the symptoms, viz. tightness of the chest, difficulty of breathing, and sense of suffocation, were not owing to some other cause, such as the mere wound of the lungs (abstracting from its letting out air) or an effusion of blood into the cells of that organ, in consequence of the wound. I thought it, (says he) therefore, proper to try to ascertain, by the following experiments, the effects of a simple wound of the lungs, and the effects of air confined in the thorax; and the rather, as in some of these cases the wound of the pleura and intercostal muscles appeared so large that it might be doubted whether the air could be confined in the chest when there seemed

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ed to be so free a passage from that cavity into the cellular membrane.

In the first experiment Mr. Hewson took a rabbit, and pulling the skin of the chest to one side, pushed a sharp knife into the cavity of the thorax, and moved it about, so that he might be certain of wounding the lungs.—He then let the skin slip back again so as to cover the wound in the intercostal muscles: and to secure it the better applied a piece of lint and plaister, as also a bandage. He says, he expected to see the animal become emphysematous, but was much disappointed: for though he repeated the experiment several times, he could not get the air to pass from the lungs into the cellular membrane.

On killing the animal, he found the
wound

wound of the lungs surrounded by a small *cochymata*, and so closed up, probably by the blood which had been effused, that no air could escape.

In his second experiment he pushed a knife into each side of the thorax of a dog, taking the same precautions, and with the same intentions as in his first experiment. He then allowed the poor animal to run about the house.—About two hours after the operation the dog seemed less lively, and afterwards seemed to him to wish to be at rest, but he had no difficulty of breathing, nor emphysema. In the evening of the same day he became as lively as before, and was so next morning, when he was killed.

On dissecting him, Mr. Hewson found no appearance whatever of air
having

having escaped into the cavity of the chest, the wounds of the lungs were perfectly closed with slight ecchymosis surrounding them, and on inflating the lungs no air escaped.

From these experiments he concluded, and I think with some probability, that a puncture or incision of the lungs would seldom produce Emphysema, on account of the effusion of blood from the divided vessels, and that the emission of air more likely happens from a superficial abrasion, or laceration of the part.

In a third experiment he tried to lacerate the lungs with a blunt probe, and so produce Emphysema, but without effect. He then made some experiments to ascertain the symptoms produced by air confined in the cavity of

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the chest. His results were the same with those already mentioned, when speaking of wounds of the thorax, so that I need not detain the reader by again repeating them.

What convinced Mr. Hewson not a little of the efficacy of paracentesis was a case to which he was called soon after performing these experiments:—
A young man, when the house was on fire, to save his life, threw himself out of the window of a second floor, and his skull was fractured by the fall: he was taken up insensible. On the evening of the same day he became Emphysematous, and breathed with difficulty; he expired in the middle of the night without Mr. Hewson having seen him while alive.

When Mr. Hewson went to examine
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the body—he found the external Emphysema but just perceptible, and that only on the right side of the chest. On laying open the abdomen, the diaphragm was observed to be depressed, and loose on the right side, and, upon puncturing the thorax, in presence of Dr. Hunter and others, some air rushed out. The lungs were found much collapsed, but there was not any extravasated blood or lymph, so that, (he says) it was evident there had been a considerable quantity of air in the cavity.

On examining the ribs, it was found that the first, reckoning from above, was fractured near its middle, and that it had lacerated the pleura a little ; and what is somewhat remarkable, the lungs were not injured near this part, but had the air escaped from a laceration

tion on the under part of their concave surface, where they are applied to or lie upon the diaphragm. Had Mr. Hewson been acquainted with, or consulted Professor Meckle's case, which happened many years prior to his writing this paper, and which was mentioned by Dr. Monro, in his lectures first about the year 1760, he might have been still more convinced of the propriety of this operation, in almost every case of Emphysema. But Mr. Hewson was anxious to be esteemed the author of this practical improvement, and, therefore, wished to keep out of view the idea of any other person having even hinted at it.

Mr. BROMFIELD, with some modesty, puts in his claim to the discovery. He had long been convinced of the efficacy of the operation, he says, but
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should have been sorry to have prevented Mr. Hewson's making himself known to the Medical Society, by a remark which he thought new.

But, alas! Mr. Bromfield, as Mr. John Bell remarks, writes very ignorantly on the subject; and shews at least that he had but a very imperfect idea of the subject.

When Mr. John Bell presumes to tell us, in what he pompously calls the *Philosophy of Emphysema*, that the moment the lungs are wounded they fall down and continue in this collapsed state until the wound is healed, and that from the *moment* they are wounded, the use of the wounded lung is lost. I say when we are told such things by Mr. Bell, we need not be surprised at the difference of opinion which exists
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among Physiologists, for the merest Tyro in philosophy must see, at once, the foolishness of this doctrine.

That the lungs collapse, in consequence of being wounded, is certain ; but that they collapse, or, as Mr. Bell has it, fall down, the *moment* they are wounded, is not only contrary to the facts observed in the experiments of HEWSON, just related, but is contradicted by all the experiments which have been made on this subject. The collapse of a wounded lung must be gradual, and it will bear some proportion to the freedom with which the air enters into the cavity of the chest.— But when there are strong adhesions betwixt the pleura pulmonalis and pleura costalis, as was supposed, in Dr. Monro's cases, the collapse will be entirely prevented; and yet we find that in these cases

cases the wounds of the lungs healed perfectly.

We cannot subscribe to Mr. Bell's opinion either, when he says, that if the lungs, when wounded, were to continue in perpetual motion, "I do not know how we should expect a cure; for the air would be continually streaming through the wound, and the wound itself alternately dilating and contracting like that in an artery, could not heal."*

We know that in innumerable instances the wound of the lungs has healed, notwithstanding this alternate dilatation and contraction, without the lungs having fallen down to the backbone, or their continuing in a collapsed state.

*Vide Bell on Wounds, vol. ii. p. 15.

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There is no doubt that, in many cases of Emphysema, the wounded lungs become collapsed, and continue so for some time, while the function of respiration is carried on with tolerable ease by the lungs of the sound side.— But though the wound should heal during the collapsed state of the lungs, the patient will not be able to expand them till the pressure of the effused air has been removed by the operation of paracentesis. And even in the collapsed state of the lungs I should suppose the wound would be dilated; for if the lungs do not then admit of the transmission of air through them, how would Mr. Bell account for the increasing oppression which he describes so justly, at p. 18. where he says, that “the air, &c. not only oppresses that side of the lungs, but by hindering the free play of the diaphragm, and load-
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ing the mediastinum, they oppress, also, the other lung, until at last the breathing, every moment, more oppressed, falls lower and lower. The pulse also sinks in the same proportion; the extremities grow cold; cold sweat bedews the forehead; and, after great tossing, and indescribable anxieties, the patient dies."

Mr. Bell must either admit, which by the bye he does, that the lungs, even in their collapsed state, permit the air to pass through the wounds, or deny these facts—and if he admits this, I should think that the wound was just as likely to heal, when the lungs were wholly or partially dilated, as when they were lying by the back bone completely collapsed. But this is wandering from the subject under consideration.

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In every case of Emphysema then, where there is great oppression of breathing and much anxiety, I would recommend the performing of the paracentesis ; it is attended with little or no danger, and is the only remedy which can give certain or permanent relief. But it is an operation which ought not to be performed in a rash or unguarded manner.

The first thing to be ascertained, is the side on which the injury was received : this, in cases of accidents, will be no very difficult matter ; but in cases similar to that of *James Hay*, it will require some consideration :—the puncture is to be made in that side on which it is supposed the lungs are injured or collapsed. If it should unfortunately

tunately be made in the sound side, it will, in most cases, prove fatal to the patient ; but this can only happen from the rashness or inattention of the surgeon, or perhaps from his being confused by circumstances so unusual. The diseased side will be pointed out, in most instances, by the appearance of the subcutaneous emphysema.

The operation Mr. Hewson thinks should be performed with a scalpel, in preference to the trocar,—a small incision should be made through the skin and intercostal muscles, so as to expose the pleura costalis. This should, then, be punctured with some care by the point of the knife ; if the accumulation of air is very great, it will rush out from the cavity of the chest with some violence,

lence, as in the case related by Mr. Kelly.

Dr. Monro prefers the trocar, and I confess I am of his opinion. If there is an accumulation of air within the thorax, there can be no danger of wounding the lung; and if we introduce the trocar in an oblique direction, and along with it a small silver canula, we can prevent the external air from getting into the cavity of the chest, a circumstance of very considerable importance, when we consider the danger to which we subject the patient by the free exposure of the cavity of the thorax to the action of the atmospheric air.

By performing the operation in this manner, we have it in our power also to empty the chest completely of the effused

effused air, by screwing upon the canula an exhausting syringe, or some such apparatus; and should the wound of the lungs still remain open, the canula may be kept in its place, and might be so contrived with a valve that would admit the effused air to escape, while it prevented the atmospheric air from entering.

Dr. Monro had a small silver stopper, which screwed into the end of the canula, and which the patient could unscrew at any time, when he found his breathing oppressed, and so allow the air to be evacuated.

I agree with Mr. Hewson in thinking that when the operation becomes necessary the best place for performing it, if the disease is on the right side, will be on the fore-part of the chest,
between

between the fifth and sixth ribs. But that if the disease is on the left side, the opening should be made between the seventh and eighth, or eighth and ninth ribs, so as to avoid the possibility of wounding the pericardium.

Lastly, I may observe, that whether the operation is done with the scalpel or trocar, the wound ought to be carefully closed up as soon as it is supposed that the whole of the effused air is evacuated. The inflammation which follows the admission of the external air into the cavity of the chest, is as much to be dreaded as the disease itself, and therefore ought to be carefully guarded against.

SECTION

SECTION III.

Of Blood-letting, &c.

WHETHER we take into consideration the immediate symptoms of the disease, or the effects they are likely to produce, we must be convinced that they are only to be moderated or prevented by the free use of the lancet. And, accordingly, we find that bloodletting forms a principal part of the practice in all the cases which I have detailed, or have had an opportunity of consulting.

In the case related by Dr. Hunter, the patient was bled twice in the course of the first afternoon, with considerable relief of the pain of his side, and difficulty of breathing. And after the
Emphysema

Emphysema was considerably subdued, it was necessary to bleed him again pretty freely on the second day; and even after this his difficulty of breathing and cough were so troublesome, that he was bled three times more, in the course of the week.

There is little doubt but that this patient owed his safety in a considerable degree to those repeated and large evacuations.

In the two cases which Dr. Monro has favoured me with, we find, that bloodletting, and keeping the bowels gently open, was the only practice required.—Both the patients had a complete recovery. The same may be said of the case of the young woman which occurred to Dr. Hamilton, for the difficulty of breathing and oppression

sion, were very much relieved by taking a considerable quantity of blood from the arm, in a full stream. Indeed it is only necessary to direct the attention of the reader, to the cases I have detailed, when, considering the various causes of this disease, to convince him of the propriety of blood-letting, in almost every instance, when the disease occurs from an injury of the lungs or thorax.

Of Friction.

In several instances we find that the practitioners have ordered the tumid parts to be rubbed with some stimulating embrocation; and I should conceive this to be not only proper, but of considerable service in promoting the absorption, or rather in discussing the

M

effused

effused air, I would recommend the use of such embrocations, and, of course, friction, chiefly in those cases which occur from internal causes, or, as I have endeavoured to explain it, from a diseased state of the circulating fluids.

In such cases no operation can be of service, except scarifying the integuments, and in such a diseased state of the system even these scarifications may be attended with danger. Friction, however, with warm flannel; the Ol. Camph. or with strong brandy, or spirits of wine, is not only safe, but may be effectual in opening the pores of the skin, and so admitting the effused air to escape.

Of Bandaging.

When there is reason to suspect that the Emphysema has succeeded to a wound in the lungs, from a fractured rib, the application of a tight bandage round the chest, as recommended by BLIZARD, and, as practised by my friend Mr. WARDROP, ought always to be employed.

I cannot give any better directions for the application of such a bandage, than those with which Mr. Wardrop concludes the account of his case :— and I shall, therefore, beg leave to transcribe his words here ; they convey all I could wish to say on the subject :—

An uniform, and gradual pressure,
says Mr. Wardrop, *regulated by the*
M 2 *feelings*

feelings of the patient, is, in every disease, where bandaging is necessary, the best general rule which can be followed.

Having now given an account of the various means recommended and practised for the cure of Emphysema, I shall conclude these observations with recapitulating, very briefly, the practice which ought to be adopted in those cases which occur most frequently, and in which a practitioner is most likely to be consulted.

If called to the patient soon after the accident, and he complains of much difficulty of breathing, and tightness across the chest, we ought immediately to take away a considerable quantity of blood from the arm, and as quickly as possible.

Upon

Upon observing the crackling tumor beginning to form over the fractured rib or injured part, several punctures should be made with the point of a lancet, pushed so deep, as to be certain they reach the cellular membrane.

These will not only relieve the lungs in some measure, by allowing the air to escape, but may also prevent the disease spreading further, or the air being more diffused under the skin.

If the Emphysema has become general, before the surgeon sees the patient, he ought to make similar punctures in various parts of the body ; particularly in those parts which are most distended ; and, by pressing the integuments, and stroaking them towards the wounds, endeavour to evacuate
the

the air in this manner. But should the patient, after these punctures and repeated blood-letting, appear nothing relieved, and still complain of oppression and difficulty of breathing, the operation of paracentesis must then be performed. The surgeon being certain of the side which is diseased or injured, and having fixed upon the place where he is to make the perforation, let him draw the skin of the chest as much as possible to one side; and, being provided with a small trocar, covered with a blunt silver canula, he ought to introduce it into the cavity of the chest in an oblique direction, and withdrawing the trocar, allow the canula to remain. This canula might be so contrived with a valve, that when the trocar was withdrawn it would allow the air confined in the chest to escape, but prevent the external from having access

cess to that cavity. But if the canula is small, and surgeon attentive, he may manage this easily with his finger.

If, after performing the operation, we find that the wound in the lungs is still open, so as to admit of the further effusion of air, the canula should be allowed to remain for some time, and a stopper made to screw into it. But if the wound in the lungs is closed up, the canula should be withdrawn as soon as the whole of the effused air is evacuated. The oblique opening which was made by the trocar, will act as a valve to prevent the air from getting into the chest, while the skin which was retracted will cover the external part of the wound, and render a small compress only necessary.

If a fractured rib is discovered, a
double-

double-headed roller, of some length, should be applied round the whole chest, with the view of preventing as much as possible the motion of the ribs during respiration.

The patient should be kept to the antiphlogistic regimen in its strictest sense, and should not be suffered to use any exertion of his body while under cure.

THE END.

OBSERVATIONS
ON THE
DROPSY in the BRAIN,

BY
ROBERT WHYTT, M. D.

Late PHYSICIAN to his MAJESTY,
President of the Royal College of Physicians, Professor of
Medicine in the University of Edinburgh, and F. R. S.

TO WHICH ARE ADDED

His other TREATISES never hitherto published
by themselves.

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O B S E R V A T I O N S

ON THE

D R O P S Y

In the B R A I N.

Never before published.



O B S E R V A T I O N S

ON THE

Most frequent Species of HYDROCEPHALUS INTERNUS,

V I Z.

The DROPSY of the VENTRICLES
of the BRAIN.

THE *hydrocephalus*, or dropfy of the head, is either external or internal. The former has its feat in the cellular substance, between the skin and the *pericranium*, or between this membrane and the skull. In the internal *hydrocephalus*, the water is sometimes collected between the *cranium* and *dura mater*, or between this last and the *pia mater*; but most commonly is found in the ventricles of the brain, immediately below the *corpus callosum*: And this is not only the most frequent

4 OBSERVATIONS ON THE

and fatal species of the *hydrocephalus*, but also that with which medical writers seem to have been least acquainted.

HIPPOCRATES, in his second book *de morbis*, has enumerated the signs of water in the brain, as his words have been rendered by all the translators. But *ἐπὶ τῷ ἐγκεφαλῷ* more properly signifies *upon* than *in* or *within* within the brain; and that Hippocrates only speaks here of water lodged between the *dura mater* and brain can scarcely be doubted, since he proposes to evacuate it, by making a perforation in the upper part of the *cranium*, *πρὸς τὸν ἐγκεφαλόν*; which operation could have been of no use, had the water been contained within the brain itself.

CELSUS has only mentioned briefly the *hydrocephalus externus*, or dropsey of the teguments of the head*. Aetius and Paulus Ægineta go a little farther; for when they treat of this disease, they observe that
water

* De medicina, lib 4. cap. 2.

DROPSY IN THE BRAIN. 5

water is sometimes found between the skull and the membranes of the brain.

HIERONYMUS MERCURIALIS, who flourished in the beginning of the sixteenth century, mentions the collection of water in the ventricles of the brain as a thing that may possibly happen; but adds, that in such a case an apoplexy must be the consequence*.

WEPFER has collected several cases from different authors, in which water was found in the cavities of the brain †; and the celebrated Boerhaave mentions such a disorder as one species of the *hydrocephalus* ‡. But none of these authors, nor indeed any other that I have met with, who wrote before them, have favoured us with the signs by which we may distinguish a dropsy of the ventricles of the brain from other diseases affecting that organ.

M. PETIT,

* Opuscula aurea, lib. de morb. puerorum.

† Hist. apoplecticorum.

‡ Boerhaave Aphorism. § 1218.

6 OBSERVATIONS ON THE

M. PETIT, in a short paper on the *hydrocephalus*, published in the Memoirs of the academy of sciences for the year 1718, observes, that in all the bodies which he had opened, he never found water any where within the *cranium*, but in the ventricles of the brain ; and therefore supposes the other species of internal *hydrocephali* to be very rare.

THE symptoms of a dropfy in the cavities of the brain, according to that justly esteemed author, are, in the beginning, slight convulsions of the mouth and eyelids, biting of the lips, grinding of the teeth, and picking of the nose, as in the case of worms. The patients are either costive or have a purging, and sometimes a vomiting. They are more or less drowsy, according to the quantity of water within the brain. They grow languid, feeble, sad, and pale ; the eyes look dull, the pupil dilates, the futures of the skull open, and its bones become soft. The forehead rises, the eyes seem to be protruded

DROPSY IN THE BRAIN. 7

truded out of their orbits, the head swells so as sometimes to burst, and the patient dies soon after.

ALTHO' this account of the symptoms of the *hydrocephalus internus* be much more just than what is to be met with in any author before M. Petit ; yet still it is so far incompleat, that I may venture to say, that it will not be found sufficient to distinguish a dropfy within the brain, unless when it is attended with a swelling in the head.

M. PETIT mentions slight convulsions of the mouth and eye-lids in the beginning ; whereas I have never seen any convulsions till towards the end. He says, the patients are always more or less drowsy ; but I, on the contrary, have often observed them more watchful at first, altho' in the advanced state they not only become drowsy but comatose. He informs us, that he never saw the water collected any where, but in the ventricles of the brain. Now, were this the case, it
is

8 OBSERVATIONS ON THE

is certain that the opening of the futures and swelling of the head could not happen but to the youngest infants, who, by the bye, are not so subject to this kind of *hydrocephalus* as children of two years old and upwards ; for, of about twenty patients whom I have seen die of this distemper, one only was under half a year old, the rest between two and sixteen ; who all went off without any swelling of the head, opening of the futures, or protrusion of the eyes.

LASTLY, M. Petit has taken no notice of the aversion to light, squinting, the variations of the pulse, and the degree of feverish heat, which, as we shall afterwards see, are the surest diagnostics of the disease.

M. LE DRAN, who wrote after M. Petit, has described the *hydrocephalus internus* in such a manner as would make one believe he had never seen the distemper, except when it happened to be joined to a
collection

DROPSY IN THE BRAIN. 9

collection of water between the *cranium* and brain *.

DR DONALD MONRO, in his treatise of the dropsy, has well enumerated the several kinds of the *hydrocephalus*: But by the symptoms he mentions, of the internal kind, we shall be hardly able to distinguish it from several other disorders of the brain, as he himself has very justly remarked.

It may seem strange, that a dropsy of the ventricles of the brain, which in our days so frequently occurs, should have been altogether unknown to the ancients, and so little attended to by most of the moderns. The reason may be, that those patients who were carried off by this disease have been generally supposed to die of a fever ending in a *coma*; and in such cases the head is seldom opened.

ALTHO' a dropsy of the ventricles of the brain does very rarely occasion any

B

opening

* See his Operations in surgery, article of the Dropsy.

10 OBSERVATIONS ON THE
opening of the futures, or swelling of the
head * ; yet in most cases it may be easily distinguished from every other disorder, by the following symptoms, which with the greatest care I have collected, in attending about twenty patients in this disease.

An

* VESALIUS gives an account of a child of two years old, whose head was greatly enlarged, and in the ventricles of whose brain he found nine pounds of water : But this is an extraordinary case ; and it is probable the water began to be collected soon after the child's birth, and before the futures of the skull could offer any considerable resistance to its pressure. I shall only add here, that I have not only never observed any increase of the size of the head in the species of *hydrocephalus* of which I now treat, but that it is an error, though a common one, to imagine, that those children who have big heads are most liable to this disease ; for of all those whom I have attended, few or none were remarkable for the largeness of their head, but several had been very sprightly, and of a delicate make.

DROPSY IN THE BRAIN. II

An Account of the SYMPTOMS in the DROPSY of the Ventricles of the BRAIN.

FIRST STAGE.

CHILDREN who have water in the ventricles of the brain begin to have many of the following symptoms, four, five, or six weeks, and in some cases much longer, before their death.

AT first they lose their appetite and spirits; they look pale, and fall away in flesh; they have always a quick pulse, and some degree of fever. In some cases I have seen a *hydrocephalus* attended with a considerable degree of fever, which had frequent remissions, but without any order or regularity: In other cases the paroxysms came on pretty regularly in the evening, and then the disease was taken for a slow irregular nervous fever, or for

12 OBSERVATIONS ON THE

one occasioned by worms. At this time, in children of five years and upwards, I have found the pulse at a hundred and ten, in others at a hundred and twenty, and in a few cases at a hundred and thirty, or even at a hundred and forty strokes in a minute; but rarely ever so full as to indicate bleeding.

IN others the quickness of the pulse and heat of the skin were not so considerable; but I do not remember to have seen any patient who had not some degree of fever in this, which I call the first stage of the disease.

WHILE the feverishness continues or increases, they lose their appetite more and more; their tongue is often white, sometimes it is remarkably clean, and towards the end of the disease acquires an aphthous redness. They are thirsty, and frequently vomit once or twice in a day, or once in two days. They complain of a pain in the crown of their head, or in the forehead above their eyes. They
are

DROPSY IN THE BRAIN. 13

are commonly coſtive, tho' ſometimes they have returns of a looſeneſs. When bound, they are not eaſily moved by a purge; ſometimes they are troubled with gripes. Their ſpirits being low, they incline moſtly to lie in bed, altho' they are often more diſpoſed to watching than to ſleep. They cannot eaſily bear the light, and complain when a candle is brought before their eyes. They are obſerved to pick their noſe, and in their ſleep to grind with their teeth, as in the caſe of worms.

THESE are the ſymptoms of the firſt ſtage, during which it is very hard to diſtinguiſh this dropſy of the brain from a ſlow irregular fever occaſioned by worms, by ſome other diſorder in the bowels, or by ſome other cauſe. In the ſecond ſtage, the ſymptoms enable us, with ſome certainty, to diſcover the nature of the ailment. But before I proceed to enumerate them, I ſhall juſt obſerve, that I never had but two patients who had not the vomiting during either the firſt or ſecond ſtage.

One

14 OBSERVATIONS ON THE

One of these was a girl of eight years of age, who, tho' she had an aversion to food, yet never threw it up but once, and that was on the third day before her death ; nor did she ever complain of a headach till twelve or fourteen days before she died ; whereas this last symptom, for the most part, begins three or four weeks, and in some cases several months, before the end of the disease : She also could bear the light better than any I have seen. The other, who had no vomiting, was a boy of eleven years ; he had little headach, altho' he lay much in bed, and did not like to be moved. But in general, the vomiting once or twice a-day, or once in two or three days, the headach*, and the aversion to light, are the symptoms which in the first stage of this kind of *hydrocephalus* characterize it most.

Symp^a

* The headach not only in this, but the succeeding stages, is in some moderate, in others severe ; in which last case, it is always easiest in the morning and worst at night ; and these patients have commonly a great aversion to food.

Symptoms of the SECOND STAGE.

I date the beginning of the second stage from the time the pulse, from being quick but regular, becomes slow and irregular. This sometimes happens about three weeks, often a fortnight or less, before the death of the patient.

IN this stage the pulse is commonly not only much slower than it was before, but often more so than in health. In a girl of thirteen, the pulse, which for a fortnight beat above a hundred times in a minute, about nine days before she died, fell to eighty-four, next day to seventy, and the day after to sixty, becoming always the more irregular the slower it was. In a youth of sixteen the pulse, which for several weeks had been feverish, on the fifteenth day before his death, beat only sixty-eight in a minute ; two days after, it fell under sixty, and once to fifty.

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A boy of nine years of age, fifteen days before he died, had a pulse from seventy to seventy-five in a minute, and irregular. In another of four years, the pulse fell to eighty-eight on the ninth day before his end. In a girl of seven years old, on the fifteenth or sixteenth day before her death, the pulse beat a hundred and fifty times in a minute; next day, it became slower than natural and irregular; for five or six days after this, it was from eighty to eighty-six in a minute.

IN two other children, who were less feverish in this stage, the pulse from a hundred fell below eighty. I have never seen a patient with water in the ventricles of the brain, whose pulse did not come down to its natural state, or very near it, except one. This was a girl of about seven, whose pulse, after being for several weeks about a hundred and thirty in the forenoon, and a hundred and forty in the evening, a fortnight before her death, fell

fell two or three strokes under a hundred; yet neither her heat nor thirst, nor other complaints abated, altho' her pulse had fallen above thirty in a minute.

IN this distemper it is observable, that when the pulse is nearly as slow, or slower than natural, it is always irregular or unequal, both as to the strength and the interval of the strokes. When it grows quicker, the irregularity lessens; and when it becomes very quick, it is then most equal and regular. Farther, it deserves notice, that, altho' in the second stage the pulse becomes much slower than it was before, the heat of the skin continues much the same, and sometimes seems rather to increase.

I have insisted the longer on the state of the pulse in this period, as from thence we can learn the surest *diagnostic*.

DURING the second stage, most of the symptoms mentioned in the first continue. The sick are then unable to sit up, tho' generally they sleep little, till towards

C

the

18 OBSERVATIONS ON THE

the end of this period, when they begin to grow drowfy. They moan heavily, yet cannot tell what ails them. Their eyes are often turned towards their nose, or they squint outwards, and sometimes they complain of seeing objects double. Some, towards the end of this stage, grow delirious, and cry out in a wild manner, as if they were much frightened: About this time also, or later, they frequently void either real worms, or some substance like worms in a dissolved state; yet this discharge gives no relief to the patient, and only helps to deceive the less experienced practitioner with regard to the nature of the disease.

THE urine in this, as well as in the other stages, varies; it has often a large sediment, sometimes none at all; but most commonly it deposits one of a light consistence and a white colour. In several I have observed the urine have a large furfuraceous sediment, till within a few days

DROPSY IN THE BRAIN. 19

days of their death, when it had no separation.

THE breath has now, but especially in the last stage, such a sickish and offensive smell, as I do not remember to have observed in any other distemper. During the second as well as the first stage, the patients are often, for some days, or parts of days, much easier than at other times.

Symptoms of the THIRD STAGE.

WHEN the pulse (which for some time was nearly as slow or slower than in a healthful state) rises again to a feverish quickness, and becomes regular, the third and last stage may be said to begin.

THIS change in the pulse is observed five, six, or seven days before death. In two patients only the pulse did not become more frequent till two days before they died; and in two others it began
to

to grow quicker nine or ten days before that event.

As the time of this change in the pulse is different in different patients, so is the degree of its quickness. In some it rises gradually from below seventy, eighty, or ninety in a minute, to a hundred and twenty, a hundred and forty, a hundred and seventy, and sometimes above two hundred, before they expire. In others the pulse gets up more suddenly, in one day perhaps from a hundred to a hundred and fifty. In the last stage, after the pulse grows quicker, it does not keep constantly to the same measure, but will be often a good deal slower for part of a day, and quicker all the rest. The pulse beats generally faster on the day they die than at any time before. In one of those whom I attended, it beat above two hundred and ten times in a minute. I never knew any go off in this disease whose pulse did not rise to near a hundred and thirty strokes in that time.

DROPSY IN THE BRAIN. 21

IN the third stage, the patient, who before was little disposed to sleep, becomes then drowsy and comatose. When roused, he utters only a few incoherent words, and appears to be insensible. The beginning of the *coma* is uncertain; it is often about the end of the second stage before the pulse grows quicker for the second time; but in a few cases I have known this quickness of the pulse come on before the patients become comatose.

FREQUENTLY one eye-lid loses its motion, and afterwards the other becomes also paralytic. About this time, or rather sooner, the pupil of one or both eyes ceases to contract, and remains dilated in the greatest light. But the time of this symptom varies much: In some it happens five, six, or seven days, in others only two or three days, before they die. Three or four days before the death of a boy of five years old, I was surprised to find the pupils, which had been much dilated before, no larger than natural. At first I
flat-

22 OBSERVATIONS ON THE

flattered myself, that the distemper had taken some favourable turn ; but was soon undeceived ; for, upon giving the child a spoonful of weak cinnamon water, with some drops of *spiritus volatilis oleosus*, the pupils became as wide as they had been the day before. In less than half an hour after, they contracted again ; but immediately dilated upon holding some spirit of *sal. ammoniacus* to his nose. I have since observed the same interchanges in the pupils of a boy of four years old, on the third day before he died. In this case the pupils not only were enlarged, by giving him a spoonful of wine, or holding volatile spirits to his nose, but also by so small a *stimulus* as my lifting up his eye-lids, which had lost all their motion, and had fallen so far down as to cover near the half of the eye. Before they are seized with the *coma*, they sometimes complain of seeing strange and frightful objects. A day or two before death, the *tunica conjunctiva* of one or
both

DROPSY IN THE BRAIN. 23

both eyes frequently becomes inflamed; but they generally continue to hear for some days after they are blind.

IN this stage, the patients are sometimes observed to be constantly raising one of their hands to their head; and are generally troubled with convulsions of the muscles of the arms, legs, or face, as well as with a *subfultus tendinum*. In a girl of thirteen, the day before she died, the hands were strongly bent inwards by a fixed spasm of their muscles. A youth of sixteen, who when in health had been liable to spasms, about the end of the second stage began to be affected once or twice a-day with a cramp in one of his arms, which ascended to his throat, and often prevented his speaking for some minutes. One of the cheeks will twice or thrice in a day grow hot and red, while the other, with the lips, remains pale and cold. These flushings generally appear two, three, or four days before death. In a boy of five years old, one side of both
his

24 OBSERVATIONS ON THE

his arms became frequently red, while the other side never changed its colour. After death, the arms and breasts have been seen of a deep purple colour.

I had one patient who, four days before he died, bled once and again at the nose.

THOSE who have been costive before, often become loose in the third stage, and complain of gripes. A day or two before death, the patient either swallows with difficulty, or not at all. Lastly, the respiration grows more frequent and laborious; and in some there is a considerable pause after every expiration. This kind of breathing I have also observed in those who have died of an apoplexy, arising from a suppression of urine.

UPON opening the heads of ten of those patients from whom I have collected the symptoms above mentioned, I found in all of them a clear thin fluid in the anterior ventricles of the brain, immediately below the *corpus callosum*.

There

There was frequently the same kind of liquor in the third and fourth ventricles ; but whether this is always the case, I cannot say, as I had not attended sufficiently to this circumstance. I never met with water between the *dura mater* and the brain, between the hemispheres of the brain, or immediately above the *corpus callosum*. Altho' there seems to be a communication between the two anterior ventricles ; yet, in two cases, I found one of them much distended, while the other contained but little water.

THE quantity of water contained in the ventricles of the brain was generally from two ounces to five ; but I have been told of one case in which it amounted to near eight ounces. This fluid does not coagulate with heat, like the *serum* of the blood, or the lymph that is found in the *pericardium*, or what is taken from the abdomen by tapping in a dropsy ; and this difference seems to be owing to the exha-

D

ling

26 OBSERVATIONS ON THE

ling arteries of the brain being much smaller than those of the other parts.

The DIAGNOSTIC SIGNS of a Dropfy within the Brain.

HAVING given an account of all the various symptoms commonly attending a collection of water in the brain, I shall now recapitulate such of them as are the surest signs by which we may distinguish this disorder from others, which so much resemble it as sometimes to deceive an experienced physician: And this will be the more necessary, as the ancients were altogether ignorant of the disease, and as the few of the moderns who treat of it seem to have described it more from theory than observation.

WHILE most of the later writers have confounded the signs of a dropfy in the ventricles of the brain with those of the
hydro-

hydrocephalus externus, a few have more reasonably assigned to this species of drop-
 sy such symptoms as commonly attend a
 compression of the brain, but without
 giving such a distinct account of the first
 appearance and progress of this disorder
 as could enable a physician to distinguish
 it from others of the head, from worms,
 from a foulness in the stomach and
 bowels, or from a slow fever ending in
 a *coma*.

I have already observed, that in the first
 stage it is hard to discover this internal
hydrocephalus. But when we meet with
 a patient under fifteen or sixteen years of
 age, seized with a slow fever of no certain
 type, and irregular in its accessions and
 remissions; when in that fever the patients
 vomit once a day, or once in two or
 three days; when they shun the light,
 and complain of a pain in the crown of
 their head, or over their eyes, after the
 fever has continued for some time, or of

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a pain thereabouts, that in some days does not abate like the headach in ordinary fevers: When these complaints neither yield much to repeated vomits, gentle purges, nor blisters, I say there is reason to suspect water in the ventricles of the brain. But as worms, and other disorders of the stomach and intestines, are sometimes attended with most of these, as well as other symptoms that accompany the internal *hydrocephalus* in its first stage, we are often at a loss to find out this disease, till it arrives at its second period, when the pulse begins to grow nearly as slow, or even slower than natural, but irregular; for this change of the pulse, added to the symptoms of the first stage, is, as I have observed, almost an infallible sign of water in the brain, if at the same time the patient is not relieved, and if the feverish heat does not abate with the quickness of the pulse *.

WHEN

* If we are to judge of the heat of the body in this disease, by feeling the hands and wrists, we shall be often deceived;

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WHEN the glands of the mesentery become scirrhus, the patients are liable to a slow fever; their pulse is quick and sometimes irregular, but is never so slow as in health. In the case of worms in the stomach and intestines, altho' the pulse be generally quick, yet sometimes it is slower than natural, and irregular; but when this happens, the skin is cool, and there is no fever. But in the dropsy of the brain, when the pulse becomes slow and irregular, neither the heat of the skin, nor any other of the feverish symptoms are sensibly abated: For in this case the motion of the heart is not accelerated in proportion to the degree of heat and fever.

WE often find a slow irregular pulse, in persons of a delicate habit, when labouring under cramps of the stomach, spasmodic colics, and violent nervous headaches,

deceived; for when these are exposed to the air, they become rather cold, while such parts as are well covered have a feverish heat.

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achs, (as they are commonly called); but it is observable, that in such cases this kind of pulse is always attended with a cool skin.

WHEN therefore, with a slow and irregular pulse we meet with thirst and a feverish heat, watching, a *strabismus*, or double sight, a *delirium*, and screaming, succeeding the symptoms mentioned in the first stage, we may strongly suspect water in the ventricles of the brain. But this is still more evident, when soon after the patient grows comatose, the pupil dilates and loses its motion, the pulse becomes quick, the cheeks are flushed, the tendons start, and convulsions follow.

IT is true indeed, that some of these very symptoms are observed towards the end of common fevers, in which, from the brain being much affected, the patient falls into a *coma* before his death. But a fever from water in the brain is easily distinguished from others, by attending to the whole course of the disease,
and

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and particularly to the pulse, which, after having been at first quick, becomes slow and irregular; and lastly acquires a greater frequency than ever. Besides, the screaming, squinting, and dilatation of the pupil, rarely occur in other fevers.

THE symptoms of no distemper resemble these of water in the brain so much as those which arise from worms in the stomach; for with a slow fever there is a want of appetite, vomiting, pain in the head, raving, and convulsions; but when worms in the stomach or intestines occasion a slow and irregular pulse, the patients have not that feverish heat so observable in the internal *hydrocephalus*.

Of the CAUSES of a DROPSY in the Ventricles of the Brain.

THE immediate cause of this disease, and indeed of every kind of dropsy, is always the same, *viz.* such a state of the parts

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parts as makes the exhalant arteries throw out a greater quantity of fluids than the absorbent veins can take up.

THIS may be owing to several causes :

I. THERE may be an original laxity, or weakness in the brain, whereby the small exhalant arteries of the ventricles will throw out the lymph faster than the absorbent veins can imbibe it.

IN children under a year old, I have frequently met with a *hydrocele*, or collection of water between the *tunica vaginalis* and the testicle, from such a cause : And this disease I have cured by small doses of rhubarb, by applying linen cloths dipt in brandy, or impregnated with the fumes of *myrrh*, *olibanum*, and *succinum*, to the *scrotum*, and by supporting the testicles with a bandage or truss. If in young children we could discover the dropsy of the brain as early as we do that of the testicles, and could apply our remedies

as

as near to the part, we should probably often succeed in the cure: Tho' a dropfy in the brain would always be more unfavourable, as the circulation there is slower and more languid than in any other part.

2. ALTHO' there has been no original weakness in the brain, yet it may have suffered so much in the time of birth, by the compression of the skull, as afterwards to give rise to a collection of water in its cavities.

3. A scirrhus tumour of the *glandula pituitaria*, or in any part contiguous to the ventricles of the brain, by compressing the neighbouring trunks of the absorbent veins, will prevent the due absorption of that fluid which the small arteries constantly exhale, and occasion a dropfy in the brain; in like manner as a scirrhus liver, spleen, or *pancreas*, are often the cause of an *ascites*. As a proof of this,

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we may observe, that M. Petit often found the *glandula pituitaria* scirrhus in those who died of a dropfy of the ventricles of the brain.

IN one case I met with a hard tumour within the right *thalamus nervorum optico-rum*: It was almost as large as a small hen's egg, of a yellowish colour within, and of a firm consistence.

4. ALTHO' there may be no obstruction in any part of the brain, a dropfy may be formed in it, merely from a too thin or watery state of the blood. When the blood is too thin, the exhalent arteries will pour forth their fluids in greater quantity than usual; while the bibulous veins will absorb them more sparingly; and from this cause the water will be apt to accumulate, either in the *abdomen*, *thorax*, or brain, according as one or other of these parts is the weakest. I have known an instance of a dropfy in the cavity of the *abdomen*, where there were no obstructed *viscera* to be seen after

after death, and where the cause of the disease seemed to be no other than a dissolved state of the blood joined to an uncommon relaxation of the vessels.

ABOUT fifteen years ago, I had a patient who died of the *hydrocephalus*, probably owing to this cause; for this child, about a year before his death, and after the measles, falling into a bad state of health, the blood taken from his arm was observed to be preternaturally thin. From this time he never recovered his looks or strength; and, about ten months after, the symptoms of the *hydrocephalus* appeared. In this case I thought it probable, that the water began to be collected in the brain soon after the measles, which first broke the health of the child, and then the blood became too watery.

5. A suppression, or a diminished secretion of urine, may also give rise to this disease. Thus grown people, who die of an *ischuria*, have often water in the ventricles

tricles of the brain, and become comatose before their death ; but such patients generally die before any considerable quantity of water is collected in these cavities.

6. LASTLY, in tedious chronic diseases, water is often collected in the ventricles of the brain, as well as in the cavity of the *pericardium*, but not in such quantity as to occasion the symptoms of a dropsy within the brain.

AN ATTEMPT to account for some of the most remarkable SYMPTOMS attending a Dropsy in the Brain.

IN general, the whole symptoms of this disease proceed from different degrees of the same cause, *viz.* the pressure or distension of the parts of the brain, occasioned by the water contained in its ventricles.

I. THE

1. *THE loss of appetite and inclination to vomit*, are owing to the disordered state of the brain, between which and the stomach there is so great a sympathy, that in wounds of the head, where the brain is hurt, a vomiting is almost a constant symptom.

2. *THE aversion to light, in the first and second stage of the disease*, proceeds from an increased sensibility of the *retina*; and this is probably owing to the irritation of the *thalami nervorum opticorum*, in consequence of the water accumulated in the anterior ventricles of the brain.

3. *THE slow irregular pulse in the second stage.*

THE motion of the heart is owing to the irritation of the returning venous blood poured into its ventricles. This irritation, however, could have no effect upon the heart, were it not for its sensibility, which depends intirely on its nerves.

Wherefore,

Wherefore, in a *hydrocephalus*, when the water is collected within the brain in such quantity as to press, with a considerable force, on the medullary substance, the nerves proceeding from it will in some degree lose their powers, and consequently the heart will be less sensible. And hence the pulse becomes often as slow, and sometimes slower than in a natural state, altho' there be a real fever in the body; which fever, were it not for this pressure on the origin of the nerves, would occasion a quick pulse.

WHEN, in this disease the pulse is slow, it is always more or less irregular; and this may also be owing to the nerves of the heart being, in some measure, deprived of their usual power, by which means that organ cannot move with its wonted steadiness and regularity.

4. *THE quick pulse in the third stage.*

OF all the symptoms that attend a dropfy in the brain, there is none so hard
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to be accounted for as the quick pulse towards the end. For if the pressure of the water occasioned the slow pulse in the second stage, one would imagine that in the third, when this pressure is increased, the sensibility of the heart should be still more impaired; and that therefore its motion should be slower, instead of being quicker. However, we find in fact, that the pulse is remarkably quicker towards the end, when the pressure of the water must be greatest; let us therefore inquire what may probably be the reason of this symptom.

WHEN, in the second stage, the pressure on the sides of the ventricles of the brain occasions the slow irregular pulse, it seems to produce this effect, by lessening the sensibility and other powers of the cardiac nerves. When in the third stage the water increases, this pressure must be greater; and therefore it might be natural to think, that these nerves should be rendered still more unfit for performing their function.

But

But we must consider, that when the sides of the ventricles are stretched by the water beyond a certain pitch, the violence done to the medullary fibres of the brain causes such an uncommon irritation as must quicken the pulse: For in animals newly dead (where we must suppose the nerves to be still more insensible and unfit for action, than in the third stage of the *hydrocephalus*) an irritation of the *medulla oblongata* restores the motion of the heart; and if, as I have observed above, the volatile salts held to the nose, or cinnamon-water taken into the mouth, by their *stimulus*, though for a short time, give new vigour to the nerves of the *uvea*, (which towards the end of this disease begin to lose their powers), why may not the irritation of the medullary part of the brain, occasioned by the immoderate distension of its ventricles, so affect the nerves of the heart as to accelerate its motion?

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IN an apoplexy, the pulse, tho' at first slow, becomes very quick towards the end; and indeed, in almost every disease, the pulse is uncommonly quick before death, not because the nerves of the heart are then more sensible, or fitter for performing their office, than they were before, but because at that time there is an uncommon struggle in the body, and all its powers are excited into action by the great irritation of the brain and nervous system. The same seems to be the case in those who are dying of a dropsy in the brain; for how much soever the medullary part of the brain may be compressed, yet the convulsions which happen in the last stage show that the brain and nerves are sensible of irritation; and still retain their power of putting the muscles in motion.

5. *THE dilatation of the pupil.*

THE contraction of the pupil is owing to the uneasy sensation excited in the re-

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tina by ^{too}~~two~~ much light; and hence it is, that in a dark place, or when the *retina* becomes insensible of the *stimulus* of light, the pupil is always observed to be wide. In the *hydrocephalus*, when the water in the ventricles presses so much on the *thalamini nervorum opticorum* as to render the optic nerves in a great measure insensible, the *retina* will no longer feel the impression of light; and therefore the pupil will remain dilated.

IN the account of the symptoms of the third stage, I mentioned an instance of a boy of five years of age, whose pupils were much dilated on the fifth day before he died; but we observed them next day to be as much contracted as is usual in a person in health placed in a moderate light. At this time, having endeavoured to rouse the patient, by holding a volatile spirit to his nose, and making him swallow some cinnamon-water, the pupil instantly became as wide as it had been the night before. In about half an hour after,

ter, I found the pupils again contracted; but they were presently enlarged as before, upon holding the spirit of *sal. ammoniacus* to his nose. This experiment I repeated four times in two days; and always with the same success.

IN this case the dilatation of the pupil was at first owing to the compression of the *thalami nervorum opticorum* by the water contained in the anterior ventricles of the brain. But soon after, the origin of those nerves which serve the *uvea* being also considerably compressed by the increased quantity of water, the longitudinal fibres of this membrane (which by their natural contractility dilate the pupil) become paralytic and flaccid, as happens in the bodies some time after death; wherefore the edges of the pupil being less drawn outward, of course it would become smaller.

THE volatile spirits applied to the nose, by irritating its nerves, so affected the brain as to give some vigour for a short

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time to the nerves of the *uvea*, by which means its longitudinal fibres, regaining their power of contraction, immediately dilated the pupil; but as soon as the effect of this *stimulus* ceased, the fibres of the *uvea* being again deprived of their contractility, the pupil returned to its former dimensions.

6. *THE slow respiration towards the end of the disease.*

IN this kind of breathing (which I have also observed in patients who died of an apoplexy and an *ischuria*) there is a considerable pause after every expiration before a new inspiration succeeds. This pause is ordinarily for a few seconds; but I have sometimes observed it longer, and in one apoplectic case it continued above half a minute. Now the brain being greatly compressed, the uneasy sensation arising from the difficulty the blood finds in passing through the lungs will be much less felt than usual: Hence, after expiration

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expiration (which is performed by the power the cartilages of the ribs have to restore themselves) a long pause intervenes before a new inspiration takes place; because the mind is not excited to put in motion the muscles concerned in inspiration, till the sense of suffocation in the breast becomes so great as to rouse, as it were, the sentient principle from its lethargic state.

Of the CURE of a DROPSY in the BRAIN.

IF this disease could be known early, and before any considerable quantity of water has been collected, it might probably be sometimes cured by purgatives, diuretics, blisters, frictions, exercise, and diet. But as it never discovers itself till so much water is accumulated as, by its pressure on the sides of the ventricles, to disturb the action of the brain, we have
little

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little to hope from any medicine. An *ascites* indeed has been often cured by diuretics, or purgatives. But if we consider the distance between the brain and the *abdomen*, (where these medicines by their *stimulus* increase, in a particular manner, the action of the absorbents, at the same time that they evacuate the watery part of the blood), the extremely slow motion of the fluids in the small vessels of the brain, and the pressure of the water on the sides of its ventricles, which must render the absorption of that fluid still more difficult, we shall see the reason why diuretics and cathartics should be so inefficacious here.

IN an *ascites* the patient is generally relieved, and sometimes cured by tapping; but in a dropfy of the ventricles of the brain, any such attempt to draw off the water, could have no other effect than to hasten death.

I freely own that I have never been so lucky as to cure one patient who had
those

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those symptoms which with certainty denote this disease *; and I suspect that those who imagine they have been more successful, have mistaken another distemper for this. I remember several years ago, that an able and experienced physician being called to a child of a year old, in a fever attended with convulsions and a *coma*, was of opinion, that the disorder proceeded from water in the head; on which account, besides blisters which had been applied before, he ordered a purge of jalap and calomel, which had a very good effect; for in two or three days the *coma* and convulsions ceased, and the patient soon recovered; which, I am persuaded, could not have been the case, had he

* The medicines I chiefly used were repeated purges of rhubarb or jalap, with calomel and blisters; by which last I have seen the patients somewhat relieved for a short time in the second stage. I have also ordered the powder of *asarum* to be drawn up into the nostrils, with a view to make a discharge of a watery humour from the vessels of the head.

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he laboured under a dropfy of the brain. Farther, this child was not only fuddenly feized with the fever, (as commonly happens when it takes to the head), but at no time of his illnefs had he either an irregular or a flow pulfe, or indeed any number of the other fymptoms which I confider as effential for diftinguifhing the *hydrocephalus internus* from another difeafe.

T H E E N D.

A N
A C C O U N T
O F

Some EXPERIMENTS made with OPIUM
on Living and Dying ANIMALS *.

THE ancient physicians imagined, that
opium extinguished the flame of life
in animals by its excessive cold; and in
later times, there have not been wanting
those who deduced its effects from a quite
opposite quality, whereby it was thought
to rarefy the blood, and to compress the
brain or origin of the nerves. These false
notions, however, of the nature and action
of *opium* have been refuted by several
of the moderns, whose writings have
thrown considerable light upon this subject.

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* August 7. 1755.

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THE following experiments were made with a view still further to illustrate the manner in which this wonderful drug produces its effects, and particularly to shew its influence upon the motion of the heart.

1. HAVING injected a solution of *opium* in water, into the stomach and guts of a frog, I observed, that in little more than half an hour it seemed to have lost all power of motion, as well as feeling; for there was no contraction produced in the muscles of its limbs and trunk by irritating them. I opened the *thorax* an hour after the injection, and found the heart, instead of between 60 and 70, making only 17 pulsations in a minute. The auricle, which was much distended with blood, always contracted first, and after it the ventricle.

2. A frog continued to move its limbs, and leap about for above an hour after

I had cut out its heart, and was not quite dead after two hours and a half.

FIVE minutes after taking out the heart of another frog, I injected a solution of *opium* into its stomach and guts. In less than half an hour, it seemed to be quite dead; for neither pricking nor tearing its muscles produced any contraction in them, or any motion in the members to which they belonged. After cutting off its head, a probe pushed into the spinal marrow made its fore-legs contract feebly.

3. EIGHTEEN minutes past four in the afternoon, I injected a stronger turbid solution of *opium* in water than that used in the preceeding experiments*, into the stomach and guts of a frog; and as it squirted out most of the solution
injected

* *Viz.* half an ounce of *opium* dissolved in eight ounces of water; which was also made use of in all the following experiments. The heat of the solution was nearly the same in all the experiments, *viz.* about 60 degrees of Fahrenheit's thermometer.

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injected by the *anus*, I threw in some more in its place. At twenty four minutes past five, I opened this frog, and observed the heart with its auricle greatly distended with blood, and beating very slowly, not above seven times in a minute. When the heart was touched with the point of a pair of scissors, its motion was rendered quicker for two or three pulsations: after which it became as slow as before.

4. IMMEDIATELY after decollating a frog, I destroyed its spinal marrow, by pushing a small probe down through its spine, which occasioned strong convulsions of all the muscles, especially those of the inferior extremities. Ten minutes after this, I opened the *thorax*, and found the heart beating at the rate of 45 times in a minute. Sixteen minutes after decollation, it moved 40 times in a minute. After half an hour it made 36, and after fifty minutes, only 30 pulsations in the minute;

minute; which were now also become very small and feeble.

N. B. WHEN I opened the *thorax* of another frog immediately after decollation, and destroying its spinal marrow, I observed its heart beating at the rate of 60 in a minute, which is four or five pulsations less than I have generally seen the hearts of frogs make in that time, when their *thorax* was opened without decollation.

5. AT nine minutes past eleven in the forenoon, immediately after decollating another frog, I destroyed its spinal marrow with a red hot wire, which produced terrible convulsions in all the muscles, as in the last experiment. I opened the *thorax* of this frog thirty-five minutes after decollation, and observed its heart beating 30 times in a minute. The contraction of the auricle regularly preceded that of the heart. The auricle was not near so much distended with blood, nor the heart so much swelled as in those frogs which had a solution

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lution of *opium* injected into their stomach and guts *. At one o'clock (*viz.* an hour and fifty-one minutes after decollation) the heart of this frog made 20 pulsations in a minute. At half an hour past two, when the room was become warmer by the shining of the sun, it beat 25 times in a minute; and when placed in the sun-beams, it performed 31 contractions in that time. After this, I removed the frog to an east window, where it was exposed to a cool breeze; upon which the motion of its heart became slower, so that in a short time it only made 25 pulses in a minute. I then exposed it a-new to the sun-beams, by which its motion was soon quickened, so that it beat 30 times in a minute.

AT twenty-five minutes past five in the evening, (*viz.* six hours and sixteen minutes after decollation and the destruction

* See No. 3. above, and Essay on the vital and other involuntary motions of animals, p. 371 & 372.

tion of its spinal marrow) the auricle of this frog's heart, which was still filled with blood, contracted 12 times in a minute; but the heart itself lay without motion, was swelled and very red: However, when pricked with a pin, it performed two or three pulsations, and then remained at rest, till roused by a new *stimulus*. At thirty-five minutes' past five; the heart seemed to be quite dead, but the auricle continued its motion; nay, at half an hour past eight, near three hours after the heart had been without motion, the auricle, which was very near as much filled with blood as when I first opened this frog, beat 11 or 12 times in the minute: Its pulsations, however, were not now so regular as to time, as they had been before.

Is it not probable, that the auricle of this frog's heart beat longer than usual, because it continued, to the last, to be filled with blood; whereas generally the auricles of frogs hearts, which are open-

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ed after decollation and the destruction of their spinal marrow, expell after some time the blood which they contain, and acquire the appearance of a small pellucid bladder filled with air?

6. I laid bare the abdominal muscles and *thorax* of a frog, by dissecting off the skin, and at twenty minutes before nine in the morning, I immersed the whole body of the frog in a turbid solution of *opium* in water, in a small basin, which I covered to prevent the frog from leaping out of it. Thirty-five minutes after immersion, I took it out of the solution, and opened the *thorax* and *pericardium*. The heart's auricle, which was much distended with blood, beat 15 times in a minute, but the heart itself only 6 times. Forty minutes past nine (*viz.* twenty-five minutes after the frog was taken out of the solution of *opium*) the heart seemed to have recovered more life; for it performed eight pulsations in a minute: The contractions of the auricle now became feebler,

feebler, and were scarce more numerous than those of the heart, but always preceded them some little time. Six minutes before ten this heart moved only six times in a minute. Twenty-four minutes past ten it made only five pulsations in sixty-five seconds, the first, third, and fifth of which pulsations were after an interval of fifteen seconds, and the second and fourth after a pause of ten seconds. Seventeen minutes before twelve, and two hours and twenty-eight minutes after the frog was taken out of the solution of *opium*, its heart moved only thrice in seventy-five seconds, and performed its *systole* very slowly. Before two o'clock afternoon the heart was quite dead; but how long, I cannot say, not having had leisure to observe it from a quarter before twelve till near two.

7. AFTER cutting off a frog's head, and destroying its spinal marrow with a red hot wire, I laid bare the abdominal muscles and *thorax*, as in the last experiment,

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ment, and immersed the whole body of the frog in a turbid solution of *opium*, at half an hour past nine in the morning. Thirty-six minutes after immersion I took it out of the solution, and opened its *thorax* and *pericardium*. The heart and its auricle beat, each, twenty-six times in a minute, and the pulsations of the auricle preceded those of the heart regularly. The heart did not appear to be more swelled or redder than in a natural state, and the auricle was not near so full of blood as in Exp. 6. Twelve minutes past ten, *viz.* six minutes after this frog was taken out of the solution of *opium*, its heart beat twenty-seven times in a minute. At eleven o'clock it performed eighteen vibrations in that time; and sixteen at a quarter before twelve. At two o'clock after noon, the auricle, which, having expelled all its blood, was now only filled with air, continued its motions; but the heart lay at rest. Ten minutes past four, *i. e.* five hours and forty-four minutes after the

the frog was taken out of the solution, the auricle of its heart beat nine times in sixty-four seconds.

8. I laid bare the abdominal muscles and *thorax* of another frog, and at fourteen minutes past eight in the morning, immersed it as above in a turbid solution of *opium*. Fourteen minutes past nine, I took it out of the solution, and laid open its *thorax* and *pericardium*; after which the heart began to beat at the rate of nine times in a minute: But the auricle, which was greatly distended with blood, made no motion, except in so far as it was agitated a little by the pulsation of the heart: Nor were the muscles of the legs or thighs brought into contraction by cutting or tearing their fibres. At half an hour past nine the heart beat only seven times in a minute; and the auricle, which was now pretty empty of blood, and, in place of it, filled with air, had a pulsation as well as the heart. Thirteen minutes before ten, *i. e.* thirty-three minutes

minutes after the frog was taken out of the solution, the auricle shewed, at considerable intervals, a very faint pulsation; but the heart lay without any motion.

9. THE same day, after cutting off the head and destroying the spinal marrow of another frog, I laid bare its abdominal muscles and *thorax*; and, at eighteen minutes past ten, immersed it in a solution of *opium*, as above. Eighteen minutes past eleven, I took it out of the solution and opened its *thorax* and *pericardium*, after which the heart began to move at the rate of eight times in a minute. Twenty-five minutes past eleven, the heart beat 15 times in a minute; and at twelve o'clock it performed between 13 and 14 vibrations in the same time. At two o'clock, (*viz.* two hours and forty-two minutes after the frog was taken out of the solution), the auricle, which was now filled with air, continued to vibrate weakly about 11 times in the minute; but the heart itself was without motion. At ten minutes

minutes before four in the afternoon, the auricle still continued to move, but more feebly than the auricle of N^o 5.

10. I laid open the whole *abdomen* of a larger frog than any of the former ; and, at twenty-two minutes past ten in the morning, immersed it in a solution of *opium*, as above. Thirty-five minutes after immersion, I took it out of the solution, and opened its *thorax* and *pericardium*. The heart was vastly red and much swelled, and its auricle greatly distended with blood ; but both were without any motion : After two minutes, however, the heart began to vibrate at great leisure, scarcely performing nine pulsations in a minute ; but the overstretched auricle made not the smallest motion. During every *systole*, the heart was remarkable paler, and in the time of its relaxation became much redder ; which appearance I observed likewise in all the frogs hearts in the above experiments, but more remarkably in those frogs who had been
 exposed

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exposed to the action of *opium*. Another thing, which I remarked in all these experiments, was, that the heart during its *systole*, became manifestly shorter; and was lengthened in the time of its relaxation. But to return; at six minutes past twelve; (*i. e.* an hour and nine minutes after the frog was taken out of the solution), its heart made only six pulsations in the minute; and at eleven minutes past twelve, observing it without motion, I pricked it with a pin, and breathed upon it, in order to renew its pulsation; but to no purpose.

II. TWENTY eight minutes past seven in the evening, I laid open the whole *abdomen* and *thorax* of a frog, and immediately after immersed it in a solution of *opium* as above. Thirty-eight minutes past seven, when I pricked its legs with the point of a penknife, it made very little motion. Two minutes after this, I turned it to its back, and observed its heart moving only between ten and eleven times

times in a minute. Having laid the frog again on its belly, that it might be more exposed to the action of the *opium*; at forty-eight minutes past seven, *i. e.* twenty minutes from the first immersion, I turned it again to its back, and observing the heart without motion, I opened the *pericardium*; which producing no effect, I cut the heart out of the body, and laid it on a plate, when it gave two or three pulses, and never after moved, though it was pricked once and again with a pin.

No motion was produced in any of the other muscles of this frog, by irritating them.

12. I cut off a frog's head and destroyed the spinal marrow with a hot wire, then laid open its *thorax* and *abdomen*, and immersed it in a solution of *opium* at nineteen minutes past eleven. Eight minutes before twelve, *i. e.* thirty-three minutes after immersion, I observed its heart beating very slowly: But two minutes before twelve, when I took it out of the solution

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of

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of *opium*, it had no motion. After this, I opened the *pericardium*, and irritated the heart two or three times with the point of a *scalpel*, which always produced a few pulsations. I then put the frog in the solution for five minutes more, and, upon taking it out, found its heart quite dead.

13. AFTER cutting off a frog's head and destroying its spinal marrow, I laid open its whole *abdomen*, and immersed it in a solution of *opium*, twenty-three minutes before one. After it had lain sixteen minutes, I cut up its *thorax* and *pericardium*; and observing the heart beating very regularly and pretty strongly twenty-one times in the minute, I immersed it again in the solution, which had now immediate access to the heart. After five minutes, I took it out of the solution; and finding the heart without motion, I pricked it with the point of a knife; upon which it began to beat at the rate of fourteen times in a minute, and continued

nued its motions very languidly, and not without some interruption, for about a quarter of an hour.

14. I cut out the heart of a frog, and put it in fountain-water at ten minutes past ten; immediately after immersion, it beat about twenty-eight times in the minute. Eighteen minutes past ten, it made six pulsations in thirty seconds. Twenty minutes after ten, I took it out of the water and laid it on a table, and observed, that as often as it was gently touched with any thing, it made one full and strong contraction, and no more: However, in four or five minutes, it began to beat of its own accord, and, at twenty-eight minutes after ten, performed nineteen pulsations in a minute. Thirty-five minutes past ten, it beat twelve times in a minute.

15. TWENTY three minutes past twelve, I cut out the heart of another frog, and put it in fountain-water. After twelve minutes immersion, I took it
out

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out of the water, when it beat above twenty times in a minute. Having put it in the water for five minutes more, it ceased from motion, and when taken out, did not move except when pricked, and then only performed one pulsation.

16. EIGHT minutes past eleven, I cut out the heart of a third frog, and put it into fountain-water. Eleven minutes after immersion its heart beat eight times in a minute, and four minutes after this it vibrated eleven times in thirty seconds; but the motion was confined to about one third part of the heart next its *apex*. Twenty minutes after immersion, it continued to move much in the same way; but in two minutes more, observing no motion in it, I took it out of the water, and laid it on a table, where it remained at rest, unless when touched. Soon after this, however, it began to move; and at twenty-five minutes after immersion, it made nine pulses in sixty-three seconds. Four minutes after this, it moved only
thrice

thrice in fifty seconds, and then ceased altogether; unless that, when pricked with the point of a knife, it gave one very faint pulsation. At forty-seven minutes past eleven, it was quite dead.

17. I cut out the heart of a fourth frog, and at thirty minutes past ten immersed it in a turbid solution of *opium* in water of the same degree of heat with the fountain-water used in the three last experiments *. After this heart had been immersed ten minutes, I took it out of the solution, and laid it on a table, but it made not the smallest motion; and when pricked with the point of a knife, though it quickly recovered its shape, yet it was not excited into a proper contraction, as the heart of N^o 14. I continued to observe this heart from time to time for more than half an hour; but it never made the least motion.

18. I cut out the heart of a fifth frog, and put it into a solution of *opium* in water

ter

* *Viz.* Nearly sixty degrees of Farenheit's thermometer.

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ter five minutes before eight. After seven minutes immersion, I took it out, and laid it on a plate, where it remained at rest. When pricked with a knife, it did not perform a full pulsation like N^o 14. but seemed to feel a little, by a very faint kind of motion which was excited in some of its fibres.

19. At thirteen minutes before twelve, I cut out the heart of a sixth frog, and immersed it in a solution of *opium*. Six minutes after immersion, it had no motion; but when pricked made one pulsation. After lying five minutes more in the solution, it was quite dead.

20. I cut out the heart of a seventh frog, and at thirty-seven minutes past nine in the morning, immersed it in a solution of *opium* as above. Forty-two minutes after nine, when I took it out of the solution, it was without motion; but when touched with the point of a knife or probe, it performed one contraction, but with less vigour and more slowly than

than the heart of N^o 14. Forty-seven minutes past nine, it began to beat of its own accord. Two minutes after this, it moved six times in a minute, but much more feebly than N^o 14. Six minutes before ten, it beat only four times in a minute: after this, it began to beat much faster; but its motions soon returned to their former slowness. At ten, after having lain near a minute without motion, it began again, of its own accord, to beat at the rate of seventeen times in a minute, and continued for eight or ten minutes after this to beat very feebly, and in an irregular manner as to time.

21. MR ROBERT RAMSAY student of medicine in this place, having dissolved two scruples of *opium* in an ounce of water and a dram of liquid *laudanum*, injected it blood-warm into the *intestinum rectum* of a very small dog near six months old. In less than a minute after the injection was made, the dog could not stand on his hinder-legs; and in
three

three or four minutes he had lost the use of them so much, that when they were strongly pinched, he neither moved them, nor seemed in the least degree sensible of pain. He could, however, still scramble about with his fore-legs; and when they or his ears were pinched, he howled remarkably, and seemed to feel considerable pain. Ten minutes after the injection, he lay as if he had been quite stupid; only when a noise was made by beating on the ground, he opened his eyes a little and howled, but presently after fell into a profound sleep. In a few minutes after this, he began to be convulsed; upon which Mr Ramsay injected a strong solution of sea salt in water into his guts, which purged him severely, and occasioned a *prolapsus ani*; soon after this, he awakened from his sleep, and gradually recovered the use of his hinder-legs; so that in less than an hour he could run about the room, though he often fell down, his legs bending under him. After three or four hours,

hours, he seemed to be quite well in every respect; but altho' the experiment was made at mid-day, he could taste no meat till late at night. When he was in the most stupid state, he could make use of his fore-legs, and complained when his ears were pinched.

22. THE same young gentleman, at my desire, made the following experiment. On the 9th of April 1755, after making an opening into the cavity of the *abdomen* of the dog on which the last experiment was made, he injected by the wound a dram of *opium* dissolved in two ounces and a half of water; but before he could stitch up the wound, about an ounce of the solution escaped. The dog lost the power of his hinder limbs almost instantaneously. Two minutes after the injection was made, he began to be convulsed; and, in two minutes more, after having raised himself upon his fore-legs, he fell down senseless. At this time Mr Ramsay laid bare the *thorax*, by dissecting off the
K teguments,

teguments, which did not seem to give the dog any pain, and could plainly feel the motion of his heart thro' the *pleura*: it beat seventy-six times in a minute, but became gradually slower*. Immediately after counting the pulse, Mr Ramsay cut the ribs on each side of the *sternum*, which he laid back in the usual way. The heart, which was thus brought in view, appeared quite turgid, and continued in motion about five minutes; during which time it performed only between sixty and sixty-five weak vibrations, for they were not compleat contractions. While the heart was thus moving, warm *saliva* was first applied to it, then cold water, and last of all oil of vitriol; which shrivelled the parts it touched almost in the same manner as a hot iron would have done; but none of them accelerated the heart's vibrations, which became gradually slower, till they ceased altogether.

THE

* The dog's heart in a natural state, and before the injection of the solution of *opium*, beat 150 in a minute.

THE fibres of some of the intercostal muscles on the right side of the *sternum* continued to be agitated with a weak tremulous motion near half an hour after the injection was made into the *abdomen*; but the intercostal muscles attached to the ribs on the sides of the *thorax* were not observed to move, nor did the diaphragm make any motion when its fibres were pricked or cut.

NOTHING remarkable was seen in the *abdomen*; only, although it was opened ten minutes after making the injection, the intestines had no motion; whereas, in another young dog, which had got no *opium*, Mr Ramsay observed the peristaltic motion continue half an hour after laying open the *thorax*.

THE dog lost little or no blood in making the wound into his *abdomen*, nor were any of his bowels hurt by it.

23. A small dog into whose stomach the late celebrated Dr Mead had forced, at four different times, a solution of two
 drams

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drams of *opium* in water, lived above an hour and three quarters after getting the first dose. *Vid.* Treatise on poisons, essay 4.

24. IT may not be improper to add here an experiment related by DR ALSTON, in his learned dissertation on *opium* *. Into the crural vein of an old dog forty-two pounds weight, he caused be injected, at three different times, half an ounce of *opium* dissolved in four ounces of water, filtrated, and of the same warmth with the blood of the animal. The first time, about fifteen drams were thrown in, and very slowly. It had no observable effect. About an hour after, eight drams more were injected slowly, and immediately the dog was seized with strong convulsions: The pulse was frequent and small, and after some time he foamed at the mouth. But there appearing no signs of immediate death, after waiting an hour more,

* Edinburgh Med. Essays, vol. v. p. i. art. xii.

more, the last nine drams were thrown in quickly; upon which the pulse became full and flow, and in a minute or so the dog expired.

FROM the preceeding experiments, we may, I think, fairly draw the following conclusions.

(a) *Opium* applied to the stomach, guts, cavity of the *abdomen* and *thorax*, and abdominal muscles, soon lessens, and after some time intirely destroys, all feeling and power of motion, not only in the parts to which it is applied, but through the whole body, N^o 1. 2. 3. 8. 11. & 22.

(b) *Opium* produces these effects much more quickly in animals which are soon killed by want of food and air, than in those which can live long without them, and the parts of whose bodies preserve a power of motion and appearances of life, for a considerable time after they are separated from each other, N^o 1. 3. &c. compared with N^o 21. 22. & 23.

(c) S. NCE

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(c) SINCE a solution of *opium* injected into the stomach and guts destroys the sensibility and moving power of frogs, fully as soon when they are deprived of their heart, as when this organ remains untouched ; it follows, that *opium* applied to these parts does not produce its effects by entering the blood, and being by its means conveyed to the brain, as some have imagined, but by its immediate action on the organs and parts which it touches ; N^o 1. compared with N^o 2. See also Edinburgh Medical Essays, edit. 3. vol. 5. part 1. p. 140.

(d) SINCE after decollation and the destruction of the spinal marrow, *opium* operates much more slowly in destroying the heart's motion in frogs, than it does when the animals are intire (N^o 6. compared with N^o 7.) ; it follows, that it must produce its effects chiefly, if not wholly, by its action on the brain, spinal marrow, and nervous system. The heart of the frog N^o 7. whose brain and spinal
marrow

marrow had been destroyed, beat 27 times in a minute, after the animal had lain thirty-six minutes in a solution of *opium*; which was only three pulsations less than the heart of the frog N^o 5. performed thirty-five minutes after the destruction of its brain and spinal marrow, although it was not exposed to the action of *opium*.

(c) WHEN *opium* injected into the veins, and thus mixed with the blood, lessens or destroys the sensibility and moving power of animals much in the same way as when it is applied to their stomach, guts, or cavity of the *abdomen*, (N^o 24.); is it not probable, that it produces these effects by its action on the extremities of the nerves which terminate upon the internal surface of the heart and whole vascular system; and perhaps also by affecting immediately the *medulla cerebri* itself? And when a solution of *opium* applied to the bare abdominal muscles of a frog deprived of its brain and spinal marrow,

does

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does after a long time considerably impair the heart's motion; is it not reasonable to think, that this is owing to the finer parts of the *opium* being absorbed by the bibulous veins and carried to the heart, and thus brought into contact with the nerves of this organ? N^o 7. compared with N^o 9.

(*f*) SINCE *opium*, without entering the blood, or being carried to the several parts of the body, destroys the power of feeling in animals merely by acting on the nerves to which it is applied (*c*) (*d*), it follows, that the nerves are the instruments of sensation, or at least necessary to it. Nor is it sufficient to destroy this conclusion, that there have been instances of animals endowed with feeling whose brains were so greatly diseased, as to seem incapable of performing their functions. It is far from being safe to build theories in physic upon a few monstrous appearances in nature.

(*g*) IT appears from N^o 4. and 5. compared

pared with No 3. 6. 8. 10. and 11. that decollation and the destruction of the spinal marrow does not weaken or destroy the heart's motion in frogs, near so soon as *opium* injected into their stomach and guts, or applied to the muscles and bowels of the lower belly and *thorax*.

(b) ALTHO' a solution of *opium* applied to the opened *thorax* and *abdomen* of a frog, after decollation and the destruction of its spinal marrow, soon weakens or destroys the motion of the heart; yet it does not produce these effects so speedily as when the brain and spinal marrow are intire, No 11. and 12. In the former case, the *opium* can only affect the heart by its topical influence; in the latter, it not only acts this way, but also exerts its powers upon the brain, spinal marrow, and whole nervous system; and therefore must produce more sudden effects.

(i) IT appears beyond doubt, from the preceeding experiments, that the heart is not exempted from the power of *opium*,

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as the learned Dr Haller has affirmed *, but has its motion destroyed by it, as well as the other muscles, only not so soon. See No 4. and 5. compared with No 3. 6. 8. & 10. and No 14. 15. & 16. compared with No 17. 18. 19. & 20.

'Tis true, that the fibres of the intercostals on the right side of the *sternum* of the dog No 22. continued to be agitated with a tremulous motion considerably longer than the heart, and when the intercostal muscles attached to the ribs were quite dead. But did not this happen because, after separating the *sternum* from the ribs, and thus cutting off all communication between it and the spinal marrow, the muscles attached to it could be no more affected by the *opium*, which had been injected into the cavity of the *abdomen*; while the heart and other muscles whose communication, by means of the nerves, with the brain and spinal marrow was intire,

* Act. Gotting, vol. 2. p. 147. & 154.

ture, continued to be exposed to its action?

(k) As Dr Langrish has observed, that the distilled water of laurel-leaves injected into the cavity of the *abdomen*, kills dogs sooner than when it is taken into the stomach *; so No 21. and 23. compared with No 22. shew, that *opium* injected into the stomach and great guts of dogs, does not produce either such speedy or powerful effects as when thrown into the cavity of the *abdomen*. And No 6. compared with No 10. shews, that a solution of *opium* applied to the abdominal muscles, does not kill frogs so soon as when all the *viscera* of the lower belly are exposed to its action.

(l) ALTHO' it seems probable, from No 22. compared with No 24. that a solution of *opium* injected into the veins of dogs, does not kill them so soon as when thrown into the cavity of the *abdomen*; yet this cannot be certainly concluded
since

* Physical experiments on brutes, p. 64.

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since the dog of No 24. was much older, and above ten times heavier than the other.

(*m*) It appears, that a solution of *opium* injected into the great guts of a dog, affects the inferior part of the spinal marrow much more remarkably than its superior part, or the brain; since the dogs of No 21. and 22. not only lost the power of motion sooner in their hinder legs than in their fore ones, but also were insensible of any pain in them, and yet howl'd strongly when their ears were pinched.

(*n*) A solution of *opium* injected into the cavity of the *abdomen* or great guts of dogs, does not destroy the feeling and power of motion of their hinder limbs, by sending any *effluvia* to their muscles; otherways it could not produce these effects so instantaneously, (No 21. & 22.). Besides, since *opium* thrown into the stomach and guts of a frog, after being deprived of its heart, destroys the sensibility and moving power of its muscles equally soon

as

as if the animal had been intire (No 2.) ; 'tis plain, that these effects cannot be owing to the finer parts of the *opium* being received into the blood, and by its means carried to the several muscles and organs.

(o) NOR does a solution of *opium* injected into the great guts, or cavity of the *abdomen* in dogs, produce its effects by transmitting through the nerves any subtle *effluvia* to the spinal marrow ; otherways its operation could not have been so instantaneous, (No 21. and 22.); nor could the spinal marrow and its nerves have recovered their functions so soon, after the *opium* was evacuated by a purgative clyster, No 21.

(p) IT remains therefore that *opium*, by affecting the extremities of the nerves of the parts to which it is applied, does, by means of their connection and sympathy with the brain and spinal marrow, destroy or prevent through the whole nervous system, the operation of that power upon which depends sensation and motion in the bodies of animals.

(q) SINCE

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(q) SINCE *opium* applied to the abdominal muscles of a frog deprived of its brain and spinal marrow does not destroy the motion of the heart so soon as when it is applied to the abdominal muscles of a frog, whose brain and spinal marrow are intire, (No 6. and 7.), it follows, that the brain and spinal marrow, and consequently the nerves derived from them, have a greater influence than any other part of the animal system upon the motion of the heart.

(r) OPIUM does not only destroy the moving power of the muscles of animals, by intercepting the influence of the brain and spinal marrow, but also by unfitting the muscular fibres themselves, or the nervous power lodged in them, for performing its office: Otherways a solution of *opium*, when applied to the abdominal muscles or *viscera* of a frog, would not put a stop to the heart's motion sooner, or indeed so soon, as decollation and the destruction of its spinal marrow, (No 4. and 5. compared with No 8. and 10.).

Opium

Opium therefore does not produce its effects solely by putting a stop to the function of the brain and spinal marrow; but its influence reaches to the fibres of the muscles themselves, or to the extremities of the nervous filaments which terminate in them.

WHEN I say the influence of *opium* reaches to the nervous filaments which terminate in the muscular fibres, it is not meant, that any *effluvia* or subtile parts of the *opium* are transmitted to them, (See (n) and (o) above), but that it destroys their powers by means of that sympathy which they have, through the brain or spinal marrow, with the nerves to which the *opium* is immediately applied.

(f) FROM the above experiments we may infer, that not only the power of voluntary motion in the muscles, but also their irritability or power of motion when stimulated, proceeds from the nerves, or is at least immediately dependent on their influence; since *opium*, which produces its effects

effects solely by affecting the nervous system, (*m*, *n*, and *o*), destroys those powers so suddenly. I know it has been lately argued by a celebrated author, that the irritability of the muscles must be independent of the nerves, because the muscles of animals preserve a power of moving when irritated for some time after the communication between them and the brain, by means of the nerves, is cut off*. But since a solution of *opium* applied to the abdominal muscles of frogs, merely by its action on the nerves, puts a stop to the irritability or moving power of the heart much sooner than the destruction of the brain and spinal marrow (*g*); is it not reasonable to conclude, that the tremulous motions of irritated muscles, after their nerves are tied, proceed from the integrity of the nervous filaments below the ligature, and the nervous power still remaining in them or in the muscular fibres themselves?

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* Act. Gotting. vol. 2. p. 134. &c.

THE tying or cutting of a nerve, only prevents the derivation of any new influence from the brain to the parts to which it belongs; but does not immediately destroy the power or influence remaining in the nerve itself. *Opium* applied in sufficient quantity to the sensible parts of animals, not only quickly puts a stop to the function of the brain and spinal marrow, and thus produces in the muscles all the effects of a ligature on their nerves, but also destroys the power of every nervous filament in the body (*r*); and therefore puts a stop to the motion of the heart in frogs sooner than the destruction of the brain and spinal marrow.

(*t*) THE almost instantaneous palsy brought on the hinder legs of a dog, by injecting a solution of *opium* into the cavity of its *abdomen*, (No 22.), and the effects of the same solution injected into the stomach and guts of a frog deprived of its heart, (No 2.), where no part of the *opium* could be conveyed to the muscles,

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nor be conceived to alter the nature of their *gluten*, shew, that the irritability of the muscles has not its seat in this *glue*, as some have lately imagined *. But if the motions of irritated muscles be owing to a disagreeable sensation excited in them or their nerves, as we have elsewhere endeavoured to shew †, it is easy to see that *opium* must, by destroying the sensibility of the muscles, of consequence also destroy their irritability.

(u) IN animals which have got a large dose of *opium*, the veins, especially those of the membranes of the brain, are observed to be much swelled; whence it has been thought, that *opium* produces its effects in the bodies of animals, partly at least, by rarefying the blood and compressing the brain: but this distension of the veins seems to be no more than a consequence of the very slow motion of the blood

* Aët. Gotting. vol. 2. p. 152.

† Essay on the vital and other involuntary motions of animals, sect. ix.; and Physiological Essays, p. 188. &c.

blood through the heart, on account of the insensibility with which this organ is affected *.

(v) SINCE *opium* soon puts a stop to the vital motions of animals, which yet continue in time of sleep with little or no diminution of their vigour; since it often eases pain without bringing on sleep; and since, by its topical action on the heart, it destroys the motion of this organ after all communication between it and the origin of the nerves is cut off †; it follows, that the effects of *opium* are not owing, as some have thought, to its producing sleep: On the contrary, the sleep which it occasions seems to be only a consequence of its impairing the sensibility of the whole nervous system.

THE

* In frogs, into whose stomach and guts I had injected a solution of *opium*, I not only found the heart's auricle, but also the great veins leading to it, much distended with blood. Vid. Essay on vital motions, &c. p. 371 & 372.

† Vid. No 12. 13. 17. 18. 19. and 20. &c. above.

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THE other effects of *opium* may be also deduced from the same cause, particularly its restraining all evacuations that are owing to an unusual irritation of the parts of the body, and at the same time promoting those natural secretions which have been diminished or stopt by spasmodic strictures of the vessels, from some uncommon *stimulus* affecting them.

(w) LASTLY, does not *opium* kill animals by rendering their several organs wholly insensible of the *stimuli* which are destined by nature to excite them into action; whence not only a stop is put to the peristaltic motion of the guts, and to the propulsion of the chyle *, but the fluids

* In a small dog, which Dr Kaul Boerhaave opened, after having given him three grains of *opium*, he observed scarce any peristaltic motion in the guts: the stomach was much distended; the *pylorus* was shut; and the bread and milk, which the dog had taken with the *opium* about ten hours before, was indigested. There was nothing like chyle in the *duodenum*, nor any lacteal vessels to be seen in the mesentery. The bladder of urine and great guts were

fluids also begin to stagnate first in the smaller and afterwards in the larger vessels *; while the heart becoming gradually less sensible of the *stimulus* of the blood with which it is distended, contracts more feebly and at greater intervals, till at last it ceases from motion altogether?

AN

were much filled, nor had the animal evacuated either urine or *feces* from the time he swallowed the *opium*; *Impetum faciens Hippocrati dictum*, p. 402. & 403. The learned Dr Haller has also observed, that *opium* puts a stop to the peristaltic motion of the guts in frogs and other animals; *Act. Gotting.* vol. 2. p. 154.

* This my worthy colleague Dr Alston observed with a microscope in frogs into whose stomach he had conveyed a few drops of a solution of *opium* in water. *Vid.* Medical Essays, vol. 5. part 1. art. 12. And indeed the great distension of the heart and its auricle in frogs killed with *opium* (No 5. compared with No 3. 6. and 10. above) indicates a more than ordinary resistance to the blood's motion in the arteries, as well as a less degree of irritability in the heart. Further, is not the slow full pulse, and dry parched mouth, in those who have got an over-dose of *opium*, owing partly to the slower motion of the fluids in the small arteries and secretory vessels of the glands? Though it must be confessed, that the dryness of the mouth may be in some measure owing to the perspiration being greatly increased by the *opium*.



A N
E S S A Y

O N T H E

Various Strength of different L I M E-
W A T E R S.

TH E Reverend and ingenious Dr
Stephen Hales having informed
me, in a letter dated May 1751, that he
had found the strength of lime-water
much increased, by powering it a second
time on quick-lime, fresh from the fire;
I thought it might be worth while to
make a few experiments, in order to de-
termine, with some degree of certainty,
the different strength of different lime-
waters: From these experiments it appear-
ed, that lime-water acquired a considera-
ble addition of strength by being power-
ed on quick-lime newly taken from the
N fire;

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fire; and that the first water got off quick-lime was sensibly stronger than the fourth and succeeding ones *.

ON the other hand, my worthy friend and colleague Dr Alston, having observed, several years since, that quick-lime continued to communicate its virtues to water much longer than any one before had imagined, tells us, that he found afterwards, by experiments, that half a dram of stone quick-lime yielded forty ounces of lime-water; and that, after a pound of the same quick-lime had afforded five hundred pounds of lime-water, the water procured from it was as strong of the lime as ever †. Hence he imagines, that as water can only be impregnated to a certain degree by quick-lime, so this will happen equally, whether the quick-lime be fresh from the fire, or has had five hundred

* Essay on the virtues of lime-water, &c. p. 38. 39.

† Philosoph. Transact. vol. 47. p. 266.; and Dissertation on quick-lime, &c. p. 4. 5. & 6. where the same thing is affirmed of oyster-shell lime.

hundred times its weight of water powdered on it before, provided the water be allowed time enough to extract the virtues of the lime*. And further affirms, that the strength of lime-water cannot be increased by flacking new-made lime in it, because the water can take up no more of the lime than it had before †.

As these experiments and conclusions appeared inconsistent with what I had advanced, the Doctor has endeavoured further to weaken the credit of my experiments, by some arguments drawn chiefly from the imperfection of the hydrostatical balance, and from the nature of quick lime and its water. In order therefore to know whether I might not have been mistaken in what I had said concerning the strength of different lime-waters, I thought it necessary to make some new experiments; an account of which I beg leave to lay before the society.

I. (a)

* Dissert. on quick lime, p. 11. & 53.

† Ibid. p. 11.

I. (a) HAVING got from my ingenious friend Mr James Gray, a cylindrical copper-vessel ending in a narrow neck, which contained exactly 100 cubical inches; I filled it with the fountain-water of this city, and by means of a very nice balance, found it weighed 25320 Troy grains *, besides the weight of the vessel itself, which amounted to 13055 grains.

(b) I powdered upon 90 grains of calcined oyster-shells, newly taken from the fire, and reduced to a powder, 96 ounces, or five hundred and twelve times their weight of boiling water. After 92 hours, during which time the infusion was frequently

* According to Mr Gray's experiments, the water which this vessel contains, only weighs 25318 grains, that is, two grains less than we have made it. This difference may have arisen from our having put a few more drops of water into the vessel than Mr Gray did. But although, in weighing fluids with this vessel, one might err six times more than this, yet it would not affect the point we have in view, which is not to determine with the greatest accuracy the different specific gravities of different lime-waters, but only to show that they are *different*.

DIFFERENT LIME-WATERS. 101

quently stirred and shaken, I decanted off the clear water, and filtered it through a piece of a very thick linen-cloth doubled; by which means it was rendered free of any crusts, and equally pellucid with fountain-water. With this lime-water I filled the above vessel, and found its weight to be 25356 grains*.

(c) MONDAY, at seven in the evening, I poured upon a pound of calcined oyster-shells, fresh from the fire, ten times their weight of water. Next morning at ten I decanted off the clear lime-water, and having filtered it, as above, filled the vessel with it; it weighed 25397 grains.

(d) TUESDAY at mid-day, I poured seven pounds of the single lime-water (c) upon one pound of calcined oyster-shells, newly taken from the fire, stirring them well for some time after; at three quarters past six in the evening, I decanted
off,

* The oyster-shells made use of in this, and the following experiments, were got from among the rubbish on the south side of the castle of Edinburgh, and were quite free of any sea-salt.

off, and filtered as above, the clear lime-water; and having filled the vessel with it, found its weight to be 25457 grains.

HENCE it appears, that 100 cubical inches of the lime-water (*b*) exceeds in weight that quantity of fountain-water by 36 grains, (*c*) exceeds it by 77 grains, and (*d*) by 137 grains.

THE specific gravity therefore of the weak lime-water (*b*) is to that of fountain-water, nearly as 704 to 703; the specific gravity of the single lime-water (*c*) is to that of common water nearly as 329 to 328; and the double lime-water (*d*) is in specific gravity to water nearly, as 186 to 185.

IT is observable, that the specific gravities of the single and double lime-waters (*c*) and (*d*) are considerably less than the specific gravities of the single and double lime-waters (*a*), and A. and B. mentioned *p.* 39. and 40. of my essay on the virtues of lime-water, &c. But if it be considered, that, in making the latter, a much less proportion of water was added to the quick-

quick-lime, than in making the former; it will appear that this difference of their specific gravities does not infer any thing against the accuracy of the hydrostatic balance; but clearly shews, that the strength of lime-water varies according to the quantity of water poured on the quick-lime.

It may be worth while to observe, that the specific gravities of the lime-waters, (*b*), (*c*), and (*d*) did not differ more than their tastes. The first was weakest and least disagreeable; the second was stronger; and the third still stronger and somewhat pungent. Further, while the double lime-water (*d*) gave, in a few minutes, a copper-colour to silver, the weak lime-water (*b*) produced no sensible change upon it.

II. HAVING formerly found, that lime-water and claret wine, mixed together in a certain proportion, acquired a colour like that of gun-powder*, I thought, that
by

* Essay on the virtues of lime-water, p. 47.

by mixing claret with different lime-waters, one might judge whether they were all equally strong of the lime or not. The result of the experiments was, that one tea-spoonful of claret required four tea-spoonfuls of the lime-water (*b*); two and about one third of (*c*); and one and a half of (*d*), to give it the full gun-powder colour. These experiments, tho' not so accurate as those made with the balance, yet clearly demonstrate a remarkable difference of strength betwixt the above lime-waters.

III. TWENTY grains of salt of tartar being mixed with eight ounces and two drams of the weak lime-water (*b*), after it had stood five days on the line, the mixture became immediately white and turbid, and soon precipitated a white powder; which, being separated from the water by filtration, and dried, weighed $2\frac{2}{3}$ gr.

THE same quantity of salt of tartar, mixed with eight ounces and two drams
of

of double lime-water, that had stood eight days on the lime, became considerably thicker and whiter than the former; and afforded rather more than seven grains of white powder.

THE same quantity of salt of tartar being mixed with eight ounces and two drams of the double lime-water (*d*), which had stood 24 hours on the lime, gave eight grains of a white powder.

IT was observable, that these three lime-waters retained the taste of the lime, after being mixed with the salt of tartar, and this equally after precipitation as before it.

SINCE the earthy powder precipitated by these different lime-waters proceeds wholly, or almost wholly, from the waters, and not from the fixed alkaline salt; * these experiments shew beyond doubt,

O

that

* What proves this is, that the calcarious matter, precipitated by mixing salt of tartar with lime-water, is greater or less, in proportion to the strength and quantity of the lime-

that double lime-water may contain thrice as much lime, as lime-water made by pouring on quick-lime 512 times its weight of water.

IV. 1. MONDAY 24th December, at eight in the evening, I poured upon a dram of fresh calcined oyster-shells, reduced to a powder, 520 drams of boiling water.

2. AT the same time, I poured upon a pound of the same calcined shells, eight pounds of boiling water.

3. TUESDAY, at eleven before noon, I poured fifty ounces of the lime-water N^o 2. on nine ounces fresh calcined oyster-shells; and, at eight in the evening, I filtered through brown paper these three waters, and put sixteen ounces of each of them into a basin by itself; and, having placed the basins in a closet, where they might be

lime-water; but not in proportion to the quantity of the salt. Thus 12 grains of salt of tartar, mixed with four ounces of strong lime-water yielded as much of this matter as the same quantity of this lime-water mixed with 18 grains of the salt.

be pretty free from dust, I let them stand 19 days. After this, I filtered the several waters through brown paper, and having collected the earthy crusts, and dried them well, I found, that No 1. afforded very near four grains, No 2. near 12 grains, and No 3. rather more than 13 grains.

ALTHO' these three lime-waters had, at the time they were filtrated, quite lost their taste; yet, observing that No 2. and 3. became turbid when mixed with salt of tartar, I added eight grains of this salt to twelve ounces of these two waters; and the white powder which was precipitated, when dried, weighed just one grain and a half.

HAVING filtered the lime-waters of No 2. and 3. into the same bottle, before I suspected that any thing of the lime remained in them, it became impossible to know which of them afforded most of the calcarious powder precipitated by the alkaline salt, or whether it did not proceed

ceed wholly from No 3. ; in which case sixteen ounces of it must have contained 17 gr. of the earthy part of the lime, and No 2. only 12 gr.

SINCE No 2. and 3. were not quite free of the lime, although they had stood exposed to the open air 19 days, and had lost above $\frac{1}{4}$ by evaporation ; it follows, that the surest way of knowing the quantity of calcarious earth contained in lime-water, is to evaporate it, as Dr Langrish did * : And if it be objected to this, that all water affords some earth when evaporated, the quantity of this may be determined by experiment ; though in many waters it may well be neglected, on account of its smallness.

IT has been argued, that quick-lime must, after many repeated affusions of water, yield as strong lime-water as at first ; because, as long as there remains any virtue in the lime, the water will extract it, and continue to do so till it has taken

* Physical Experiments on brutes, p. 11.

taken up as much of the lime as it can bear. But to this we cannot agree : For, though there is undoubtedly a certain degree of strength which lime-water can never exceed ; yet, in order to communicate to water this degree of strength, slacked lime may not only be insufficient, but repeated additions of quick-lime may be necessary ; unless perhaps a very small proportion of water is poured upon it. Quick-lime, fresh from the fire, yields its virtues more easily than when weakened by long exposition to the air, or by many affusions of water : The water must extract the virtues of the latter, while the former, by a sort of explosive force of its own, quickly impregnates the water. Nor is it to be wondered at, that quick-lime, fresh from the fire, should, at first, impregnate water more strongly with its virtues than it does afterwards. This is as easily conceived, as that boiling water should extract more of the virtues of tea or coffee than cold water. The only difference is,
that

that the *menstruum* in the latter case acts more powerfully, while in the former the substance to be extracted affords its finer parts more readily, and in greater abundance.

UPON comparing the experiments No I. with those of No III. and IV. it appears, that the difference between the specific gravities of different lime-waters and common water, is much more than the weight of the calcarious matter contained in these lime-waters: There must, therefore, be something else besides this earthy matter which quick-lime communicates to water, by which its weight is increased*. Perhaps

* As lime-water, after its earthy part has been precipitated by an alkaline salt, continues to taste strongly of the lime, it follows, that, besides this earth, it contains some more active and subtile part, to which its taste and virtues are chiefly owing: For we know that the calcarious matter of lime-water is perfectly insipid and void of any other virtue than what all absorbent earths possess. This active and more subtile part of lime-water seems to be separated from its earth by the alkaline salt, which strongly attracts and embraces it. And hence lime-water mixed with salt
of

DIFFERENT LIME-WATERS. 111

haps quick-lime may also, in some other way unknown to us, alter the specific gravity of water. But whatever may be in this, it is evidently unreasonable to deny, that lime-water is as much specifically heavier than common water, as the hydrostatic balance or other accurate experiments shew, because we cannot account for this excess of gravity from any thing we know of the contents of lime-water. This is no less unphilosophical, than if one was to doubt of universal gravity, because philosophers have hitherto attempted in vain to account for it. If we mistake not the matter much, the contrary has always been the opinion of mankind, *viz.* that every well attested fact is to be believed, although we are ignorant

of tartar does not lose its taste of the lime, by being exposed to the open air. Does not a solution of a fixed alkaline salt in water, poured on quick-lime, separate this subtle active matter of quick-lime from its earthy part, by strongly attracting it? And do not soap-leys consist of water and fixed alkaline salt united with this active part of quick lime, without any, or almost any, of its earthy part?

ignorant of its cause, or cannot shew the particular way in which it happens.

ENOUGH; it may perhaps be thought more than enough, has been said, to shew, that the strength of lime-water is very different, according to the different quantities of water poured on quick-lime. However, I must be allowed to say, that this point, which has been disputed by my good friend, is of that consequence as to deserve to be fully cleared up; since to such as drink lime-water, with a view to the cure of the stone, it is of no small importance to know, how it may be prepared so as to have the surest and speediest effects. And as lime-water, injected into the bladder will undoubtedly dissolve a stone lodged there; it is evident, that, after the bladder has been accustomed to the weaker lime-waters, or to these even softened with a little sweet milk, the dissolution of the stone may be much hastened, by injecting such as are more strongly impregnated with the virtues of the lime.

WITH

WITH regard to the lithontriptic powers of oyster-shell and stone lime-water, I shall only say, that, as in a variety of experiments made during the course of ten years, I had always observed the superior efficacy of the oyster-lime water, I thought it to no purpose to make a new trial: Any one who doubts on which side the truth is, may easily satisfy himself. But, in making the experiment, the *calculi* should either be immersed in a large quantity of lime-water, or else it should be renewed upon them every three or four days.

P

A



A

L E T T E R

T O T H E

Rev. THOMAS BIRCH, D.D. Secret. R. S.
from JOHN PRINGLE, M. D. F. R. S.
inclosing two papers communicated to
him by ROBERT WHYTT, M. D. F. R. S.

Pallmall-Court, St James's, Dec. 10. 1757.

SIR *,

ABOUT three weeks ago I put into
your hands an extract of a letter I
had then received from Dr Whytt, con-
taining a postscript to his observations on
Lord Walpole's case, and slightly men-
tioning some doubts he had then about
the justness of Dr Springsfeld's experi-
ments

* First published in the Phil. Transf. and read Decem-
ber 15. 1757.

ments with lime-water, from some trials he himself had made, upon reading that gentleman's curious treatise on the extraordinary lithontriptic quality of the waters at Carlsbad in Bohemia. Within these few days, Dr Whytt having favoured me with a full account of those experiments, I have herewith sent you his paper, in order, if you please, to lay it before the society; which the author desires may be done, in case these observations should be judged useful.

THE other paper inclosed was sent me by the same hand, to be likewise presented to the society, as a well-attested instance of the electrical power in the cure of a palsy. To the other testimonies I have subjoined what Dr Whytt says in his letter to me, by way of strengthening the evidence. I shall only add, that since Mr Brydone, the author of this account, has omitted telling how long the patient has continued in perfect health since the operation, it appears she must have been
welll

well for some months before the date of his paper; because, before the end of last summer, Dr Whytt transmitted the same case to me, which I then returned, in order to have it drawn up in a fuller manner, and with other vouchers besides the gentleman who performed the cure. The Doctor has been so good as to comply with my request, having procured a more ample account of the circumstances from Mr Brydone, and the attestation of two ministers, besides that of the patient herself *. My difficulties being thus removed,

* After this paper was read at the society, Dr Pringle having acquainted Dr Whytt, that Mr Patrick Brydone had omitted, in his account, the name of the parish where the woman lived, the time when she was cured, and also that he had not fully dated his paper; Dr Whytt some time after wrote to Dr Pringle, that having desired Mr Brydon to furnish him with these particulars, he had received for answer, " That the woman, on
 " whom the cure was performed, had lived all her life
 " in the parish of Coldingham, and for the last twelve
 " years in that town: That her father had died of the
 " palsy seven years ago, after having been subject to
 " that

ved, I believe I may now with freedom offer this very curious case to the attention of the society. I am,

S I R,

Your most obedient humble servant,

JOHN PRINGLE.

“ that distemper for several years: That the cure was
“ performed in his father’s house as Coldingham, on
“ the 4th, 5th, 6th, and 11th days of April 1757, a
“ circumstance he had noted down: That as to the date
“ of his paper presented to the Royal society, he only
“ recollects it was written some day in the beginning of
“ November last: But as the woman still continued well,
“ he hoped the precise day of the month was no material omission.” This letter to Dr Whytt is dated, Coldingham, January 9. 1758.

POST;

P O S T S C R I P T

T O

Dr WHYTT's observations on Lord WAL-
POLE'S CASE*.

“ I Do not know, if it be worth while to
“ I observe, that lately, in making some
“ experiments with different *calculi*, there
“ was one almost as white as chalk, but
“ of a less hard substance than the others ;
“ and which was not in the least degree
“ dissolved or softened by being infused
“ twenty days in oyster-shell lime-water,
“ but yielded somewhat to a solution of
“ Spanish soap in common water.

“ FROM this experiment one may con-
“ clude, that it is better to prescribe both
“ soap

* Read December 8. 1757.

“ soap and lime-water for the stone, than
 “ any one of them alone; and that, if
 “ one of these remedies has failed of gi-
 “ ving relief, the other ought to be tried:
 “ for as the above white *calculus*, which
 “ yielded a little to the solution of soap,
 “ resisted lime-water; so there may
 “ perhaps be others that are readily dis-
 “ solved by lime-water, but little affected
 “ by soap.

“ DR SPRINGSFELD'S experiments
 “ with lime-water are somehow not just;
 “ for in several *calculi* I have found the
 “ dissolving power of oyster-shell lime-wa-
 “ ter above eight times greater than he
 “ makes it.”

SOME

S O M E

O B S E R V A T I O N S

On the Lithontriptic Virtue of the Carlshad waters, lime-water, and soap: In a letter to Dr JOHN PRINGLE, F. R. S. from Dr ROBERT WHYTT, F. R. S. and Professor of medicine in the university of Edinburgh.

S I R *,

FROM the experiments related in Dr Springsfeld's *Commentatio de prerogativa thermarum Carolinarum, &c.* which you were so good as to send me some time ago, it appears, that these waters are not only possessed of a very extraordinary power of dissolving the stone, but that in

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this

* Read, December 15. 1757.

this respect they greatly exceed lime-water.

(A) THUS, Dr Springsfeld having infused, for 14 days, in a heat of 96 degrees of Fahrenheit's scale, three pieces of the same *calculus*, each weighing 30 grains, in eggshell-lime-water, the Carlsbad water, and in the urine of one who daily drank this last water, renewing these several menstruums every day, he found, on the 15th day, that the *calculus* in the lime-water had lost one grain, the *calculus* in the Carlsbad water six grains, and that in urine five grains.

(B) AGAIN, having divided another *calculus* into four parts, each of which was reduced to 80 grains, he put the first in oyster-shell lime-water, the second in Carlsbad water, and the third in the urine of a person who drank this water. After 20 days, during which time the menstruums were renewed every day, and kept in a heat of 96 degrees, the dried *calculi* had

had lost of their weight as follows: The first 3 grains, the second 18 grains, and the third 14 grains.

ALTHOUGH I make no doubt that Dr Springsfeld, who appears to be a man of candour, as well as learning, has faithfully related the event of the experiments which he made; yet either the lime-water he used must have been very weak, or some other mistake must have happened in his experiments: For in all the numerous trials I made, about fifteen years ago, of lime-water as a solvent for the stone, I always found its dissolving power much greater than it appears in Dr Springsfeld's experiments. And as in these trials different urinary stones were used, it can scarcely be imagined, that it was owing to the peculiar hardness of Dr Springsfeld's *calculi*, that the lime water made so little impression on them. However, to be still further satisfied of this matter, I made the following experiments.

1. I put a piece of a very hard *calculus*, which I shall call *x*, weighing 80 grains, in oyster-shell lime-water, renewing the lime-water every day, and keeping it in a heat between 90 and 106 degrees of Fahrenheit's scale. After 20 days, I took out the *calculus*; and having set it by for some days, till it was become quite dry, I brushed away all the rotten part of it, which was reduced to a kind of chalky powder, and found that the undissolved part of it weighed 57 grains.

2. AT the same time a piece of another *calculus*, *z*, weighing 15 grains, was, after a like infusion of 20 days in oyster-shell lime-water, reduced to 10 grains.

3. I put a piece of *z*, weighing 14 grains, in a solution of half an ounce of the internal part of Spanish soap in nine ounces of water, and every third day renewed the solution, which was kept in a heat of about 60 degrees. After 14 days, I found the undissolved part not to exceed 11 grains.

4. A

125 LIME-WATER, AND SOAP.

4. A piece of white chalky *calculus*, *y*, weighing 30 grains, had near 4 grains of its substance dissolved, by being 14 days infused as above in a solution of soap.

FROM N^o 1. above, compared with Dr Springsfeld's exper. (B), it appears, that the dissolving power of oyster-shell lime-water is to that of the Carlsbad water as 23 to 18, supposing the *calculi* used in these experiments to have been equally easy to dissolve.

N^o 3. compared with Dr Springsfeld's exper. (A), shews, that the dissolving power of a solution of the inner part of Spanish soap, in a heat of 60 degrees, is to that of the Carlsbad water, in a heat of 96 degrees, as 15 to 14.

FROM N^o 4. compared with (A), the dissolving power of soap is to that of the Carlsbad water only as 4 to 6; but it is probable, that had the solution of soap been kept in a heat of 96 degrees, its dissolving power would, even in this experiment,

ment, have nearly equalled that of the Carlsbad water. It may, perhaps, be worth while to observe, that a piece of the white chalky *calculus* of N^o 4. was not in the smallest degree dissolved by lying in lime-water 20 days.

5. IN exper. 19. of my Essay on the virtue of lime-water, a piece of *calculus*, *b*, weighing 31 grains, lost 7 grains by being infused 36 hours, in a heat of above 100 degrees, in very strong oyster-shell lime-water. And in the same water, of a moderate strength, another piece of *b* lost, in the same time, 5 grains.

IN this last experiment, the lithontriptic virtue of lime-water appears to be stronger than in N^o 1. and 2. above; and greatly exceeds that of the Carlsbad water in Dr Springsfeld's exper. (A) and (B).

BUT although, from what has been said, it appears, not only that lime-water, but also a solution of soap, dissolves the
stone

stone in close vessels as fast, nay faster than the *thermæ Carolinæ*; yet these last waters, when the *calculi* were so placed in open vessels, that the water from the fountain might constantly flow along them, effected a much quicker dissolution than lime-water or even soap-ley, or indeed any known *menstruum*, except, perhaps, strong spirit of nitre: For, in the first experiment made by Dr Springsfeld, a *calculus* of two ounces and a half was, in this manner, quite dissolved in six days. From this experiment, compared with that of Dr Springsfeld mentioned above (B), it will be found, upon calculation, that the dissolving power of the Carlsbad water, when it is allowed to flow constantly from the fountain along the stone, is nearly 39 times greater than when it is only poured fresh on the *calculus* once a day*. What may have been the reason of this surprising difference of the lithontriptic power of the Carlsbad water in these different

* Vid. Essay on the virtues of lime water, edit. 2. p. 176. 177.

different circumstances, I will not pretend to say. I think it can scarcely be accounted for from the gentle motion of the water along the surface of the *calculus*. Was it then owing to some very volatile active part, which the water quickly loses, after being taken from the fountain?

BUT how great soever the dissolving power of the Carlsbad waters may be, when they issue from the bowels of the earth; yet that they do not communicate a much greater dissolving power to the urine than lime-water, will appear from comparing the two following experiments.

IN Dr Springsfeld's exper. (A) above, the urine of a person who drank the Carlsbad waters, reduced, in 14 days, a piece of *calculus*, weighing 30 grains, to 25 grains. And in an experiment made by Dr Newcome, now Lord Bishop of Llandaffe, who drank four English pints of oyster shell lime-water daily, his Lordship's urine reduced, in four months, a
piece

piece of *calculus*, weighing 31 grains, to three small bits, weighing in all six grains *. Whence it follows, that the dissolving power of his Lordship's urine must have been to the dissolving power of the urine of the person who drank the Carlsbad waters nearly as 35 to 65 †. But if we consider, that the *calculus* infused in the urine of the person who drank the Carlsbad waters was kept always in a heat of 96 degrees, while in Dr Newcome's experiment, which was made during part of the autumn and winter, no artificial heat was used, it will appear probable, that the dissolving power of his Lordship's urine was little inferior to that of the person who drank the Carlsbad waters; for lime-water, in a heat of 96 degrees, dissolves the *calculus* at least twice as fast as in the common heat of the air in winter. Further, if it be attended to, that the quantity of Carlsbad waters drank e-

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very

* Essay on lime-water, edit. 2. p. 208. &c.

† Ibid. p. 176. & 177.

very day before dinner is from fix to eight lib. while his Lordship only drank four lib. of lime-water in 24 hours, it will follow, that whatever the different dissolving powers of the lime-water and Carlsbad waters may be out of the body, yet the former seems, in proportion to the quantity drank, to communicate at least an equal dissolving power to the urine.

BUT without presuming to decide certainly as to the comparative virtue of the Carlsbad waters and lime-water, I shall conclude with observing, that though the Carlsbad waters are less disagreeable to the taste, and may be drank in larger quantity than lime-water ; yet this last may be drank equally good in all places, and at all seasons of the year ; which is not the case with the Carlsbad waters.

November 30. 1757.

A N

A N
I N S T A N C E

O F T H E

ELECTRICAL VIRTUE in the cure of a
PALSÝ.

By Mr PATRICK BRYDONE*.

ELIZABETH FOSTER, aged 33, in poor circumstances, unmarried, about 15 years ago, was seized with a violent nervous fever, accompanied with an *asthma*, and was so ill, that her life was despaired of. She recovered, however, from the violence of her distemper; but the sad effects of it remained. For, from this time, she continued in a weakly uncertain state of health, till the month of July

* Read December 15. 1757.

July 1755, when she was again taken ill of the same kind of fever; and after it went off, she was troubled with worse nervous symptoms than ever, ending at last in a paralytic disorder, which sometimes affected the arm, sometimes the leg, of the left side, in such a manner as that these parts, though deprived of all motion for the time, yet still retained their sensibility. In this condition she remained till the spring 1756, when unexpectedly she grew much better; but not so far as to get quite rid of her paralytic complaints, which, in cold weather, seldom failed to manifest themselves by a numbness, trembling, sensation of cold, and a loss of motion in the left side.

THIS paralytic tendency made her apprehensive of a more violent attack; which accordingly soon happened: For, about the end of August, in the same year, her symptoms gradually increased, and, in a very short time, she lost all motion and sensation in her left side. In
this

this state she continued throughout last winter, with the addition of some new complaints; for now her head shook constantly; her tongue faltered so much, when she attempted to speak, that she could not articulate a word; her left eye grew so dim that she could not distinguish colours with it; and she was often seized with such an universal coldness and insensibility, that those who saw her at such times scarce knew whether she was dead or alive.

WHILST the woman was in this miserable condition, observing that she had some intermissions, during which she could converse and use her right leg and arm, in one of these intervals I proposed trying to relieve her by the power of electricity. With this view, I got her supported in such a manner as to receive the shocks standing, holding the phial in her right hand, whilst the left was made to touch the gun-barrel. After receiving several very severe shocks, she found herself

self in better spirits than usual ; said she felt a heat, and a prickling pain in her left thigh and leg, which gradually spread over all that side ; and after undergoing the operation for a few minutes longer, she cried out, with great joy, that she felt her foot on the ground.

THE electrical machine producing such extraordinary effects, the action was continued ; and that day the woman patiently submitted to receive above 200 shocks from it. The consequence was, that the shaking of her head gradually decreased, till it entirely ceased ; that she was able at last to stand without any support ; and on leaving the room, quite forgot one of her crutches, and walked to the kitchen with very little assistance from the other. That night she continued to be well, and slept better than she had done for several months before, only about midnight she was seized with a faintishness, and took notice of a strong sulphureous taste in her mouth ; but both faintness and that taste
went

went off, upon drinking a little water. Next day, being electrified as before, her strength sensibly increased during the operation, and when that was over, she walked easily with a stick, and could lift several pounds weight with her left hand, which had been so long paralytic before. The experiment was repeated on the third day; by which time she had received in all upwards of 600 severe shocks. She then telling us that she had as much power in the side that had been affected as in the other, we believed it unnecessary to proceed farther, as the electricity had already, to all appearance, produced a complete cure. And indeed the patient continued to be well till the Sunday following, *viz.* about three days after the last operation; but upon going that day to church, she probably caught cold; for upon Monday she complained of a numbness in her left hand and foot; but, upon being again electrified, every symp-
tom

tom vanished, and she has been perfectly well ever since.

Coldingham,

Nov. 1757.

PATRICK BRYDONE.

THAT the above is a true and exact account of my case, and of the late wonderful cure wrought on me, is attested by

ELIZABETH FOSTER.

I was eye-witness to the electrical experiments made by my son on Elizabeth Foster, and saw with pleasure their happy effects. By the blessing of God accompanying them, from a weak, miserable, and at sometimes almost an insensible state, she was, in a very short time, restored to health and strength; of which the above is, in every respect, a true account.

ROBERT BRYDONE,

Minister of Coldingham.

EXTRACT

E X T R A C T

O F A

L E T T E R

F R O M

Dr WHYTT to Dr PRINGLE, relating to
this account: Dated *Edinburgh*, 1st
December 1757.

SOME days ago, I had transmitted to
me Mr Brydone's account (inclosed)
of the success of the electrical shocks in a
paralytic patient, attested by the patient
herself, and by Mr Brydone's father, who
is minister at Coldingham, in the shire of
Berwick. At the same time I had a let-
ter from the Reverend Mr Allan, minister
of Eyemouth, (in the neighbourhood), in-
forming me, that he had examined the
S patient

patient particularly, and found Mr Brydone's account to be perfectly true. He further informs me, that he never observed the electrical shock so strong from any machine as from Mr Brydone's. It seems, that gentleman has not only applied himself to the study of natural philosophy, but also of medicine.

ROBERT WHYTT.

CASES

C A S E S

OF THE

REMARKABLE EFFECTS
of BLISTERS,

I N

Lessening the Quickness of the Pulse in
Coughs attended with Infarction of the
Lungs and Fever.

First Published

In the PHILOSOPHICAL TRANSACTIONS, Vol. 50. Part 2.



C A S E S

O F T H E

REMARKABLE EFFECTS
of BLISTERS,

I N

Lessening the Quickness of the Pulse, in
Coughs attended with Infarction of the
Lungs and Fever *.

ONE of the most natural effects of
'blistering plaisters, when applied to
the human body, is to quicken the pulse,
and increase the force of the circulation.
This effect they produce, not only by
means of the pain and inflammation they
raise in the parts to which they are ap-
plied, but also because the finer particles
of

* Read February 16. 1758.

of the *cantharides*, which enter the blood, render it more apt to stimulate the heart and vascular system.

THE apprehension, that blisters must in every case accelerate the motion of the blood, seems to have been the reason why some eminent physicians have been unwilling to use them in feverish and inflammatory disorders, till after the force of the disease was a good deal abated, and the pulse beginning to sink. However, an attentive observation of the effects which follow the application of blisters in those diseases, will shew, that instead of increasing, they often remarkably lessen the frequency of the pulse. This I had occasion formerly to take notice of*, and shall now evince more fully by the following cases,

I. A widow lady, aged about fifty, was seized (December 1755) with a bad cough, oppression about her stomach and breast, and a pain in her right side, tho'

not

* Physiological essays, p. 69.

not very acute. Her pulse being quick, and skin hot, some blood was taken away, which was a good deal fizy: Attenuating and expectorating medicines were also prescribed. But as her complaints did not yield to these remedies, I was called on December 26th, after she had been ill about ten days; at which time her pulse beat from 96 to 100 times in a minute, but was not fuller than natural. I ordered her to lose seven or eight ounces more of blood, which, like the former, was fizy; and next day, finding no abatement of her complaints, I advised a blister to be applied, in the evening, to that part of her right side which was pained. Next morning, when the blister was removed, the pain of her side was gone, and her pulse beat only 88 times in a minute, and in two days more it came down to 78. However, after the blistered part became dry, the pulse rose in in one day's time to 96, and continued between that number and 90 for four days;

days ; after which I ordered a large blister to be put between her shoulders. When this plaister was taken off, her pulse beat under 90 times in a minute ; and next day it fell to 76, and the day after to 72. The cough and other symptoms, which were relieved by the first blister, were quite cured by the second.

II. JOHN GRAHAM bookbinder in Edinburgh, aged thirty-seven, of a thin habit of body, formerly subject to coughs, and thought to be in danger of a *phthisis pulmonalis*, having exposed himself unwarily to cold in the night-time, was, about the end of January 1756, seized with a bad cough and feverishness ; for which he was bled, and had a diaphoretic julep, a pectoral decoction, and a mixture with *gum. ammoniacum* and *acetum scilliticum*, given him by Mr James Ruffel, surgeon-apothecary in this place. On the 12th of February, after he had been ill above a fortnight, I was desired to visit him.

him. He seemed to be a good deal emaciated; his eyes were hollow, and cheeks fallen in: He was almost constantly in a sweat; coughed frequently, and spit up a great quantity of tough phlegm, somewhat resembling *pus*: His pulse beat from 112 to 116 times in a minute. In this condition I ordered immediately a blister to be applied between his shoulders, which lessened in some degree his cough and spitting, as well as the frequency of his pulse; but the blistered part no sooner began to heal, than he became as ill as before, and continued in this bad way nine or ten days, gradually wasting with continued sweats, and a great spitting of a thick *mucus*. During this time he used *tinctura rosarum*, and the mixture with *gum. ammon.* and *acet. scillit.* without any sensible benefit, and had six ounces of blood taken away, which was very watery, and the *crassamentum* was of a lax texture. In this almost desperate condition, another blister,

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larger

larger than the former, was put between his shoulders, which remarkably lessened his cough and spitting, and in two or three days reduced his pulse to 96 strokes in a minute. After this he continued to recover slowly, without the assistance of any other medicine, except the *tinctura rosarum*, and the mixture with *gum. ammon.* and *acet. scillit.* and at present he enjoys good health.

III. MRS. ———, aged upwards of forty, who had for several years been subject to a cough and spitting in the winter-months, was, in October 1756, seized with those complaints in a much greater degree than usual; to remove which she was blooded, and got some attenuating and pectoral medicines from Mr John Balfour, surgeon-apothecary in Leith. I was called on November 11th, after she had been ill several weeks, and found her in a very unpromising condition. She had a frequent and severe cough, with
great

great shortness of breath and wheezing ; her lungs seemed to be quite stuffed with phlegm, of which she spit a vast quantity every day, and of such an appearance, that I was apprehensive it was, in part at least, truly purulent. When she sat up in a chair, her pulse beat above 130 times in a minute. She had a considerable thirst, and her tongue was of a deep red colour, with a beginning aphthous crust on some parts of it. She was so weak, and her pulse so feeble, that there was no place for farther bleeding: A blister was therefore applied to her back, November 11th, which somewhat lowered her pulse, and lessened the shortness of breathing and quantity of phlegm in her lungs. November 16th, a second blister was laid to her side, which gave her still more sensible relief than the former, and reduced her pulse to 114 strokes in a minute. November 25th, a third blister was applied to her back, by which her cough and wheezing were rendered considerably

siderably easier, and the phlegm which
 she spit up, lost its purulent appearance,
 became thinner, more frothy, and was
 much less in quantity. Her pulse beat
 now only 104 times in a minute. After
 this her cough and spitting increasing a-
 gain, she had, on the 20th of December,
 a fourth blister applied to her back,
 which, like the former, did her great ser-
 vice. Her stomach being extremely de-
 licate, I scarce ordered any medicines for
 her all this time, except a cordial julep,
 with *spir. volat. oleos.* tincture of rhubarb
 as a laxative, and a julep of *aq. rosar. acet.*
vin. alb. and *syr. balsam.* of which last she
 took two table-spoonfuls twice or thrice
 a-day in a quarter of a pint of lint-seed
 tea. After the fourth blister, she drank
 for some time a cup-full of *infusum ama-*
rum twice a-day, and continued to reco-
 ver slowly: And though during the re-
 maining part of the winter she was, as u-
 sually, a good deal troubled with a cough,
 yet

yet in the spring ſhe got free from it, and is now in her ordinary health.

IV. CHRISTIAN M'EWEN, aged twenty-one, had laboured under a cough, thick ſpitting, pain of her breaſt, and pains in her ſides affecting her breathing, for about a twelve-month: And after getting, by proper remedies, in a good meaſure free from thoſe complaints, her cough, from catching a freſh cold, increaſed to a greater degree than ever, became hard and dry, and was attended with a conſtant difficulty of breathing, pain in her left ſide, and headach. After having been ſeven or eight days in this condition, ſhe was admitted into the Royal Infirmary, January 9th, 1757. As her pulſe was ſmall, though very quick, *viz.* beating 130 times in a minute, I thought it unneceſſary to bleed her, as from former experience I did not doubt but that bliſtering alone would relieve her. I ordered, therefore, a large bliſter to be applied to her
left

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left side, where she complained of pain, and prescribed for her the following julep :

R. Aq menth simp. spirit. Minderer. ana unc. iij.
acet. scillit. unc. i. sacchar. alb. unc. ij. Misce; cap.
coch. ij. ter. in die.

She was also desired to breathe frequently over the steam of hot water, and to drink lintseed-tea.

JANUARY 10th. Her pulse beat only 112 times in a minute, and was somewhat fuller than on the 9th. The blister was not removed till late in the evening, and made a plentiful discharge. The cough having been so severe last night as to keep her from sleep, I ordered her the following anodyne draught.

R. Spirit. Minderer. unc. fs. acet. scillit. drach. i. syr.
papav. alb. drach. vi. Misce; cap. hor. somni.

JAN. 11th. The cough easier last night; difficulty of breathing less; pulse 108 in a minute. Ordered the anodyne draught

to be repeated, and the use of the julep, with *acet. scillit.* to be continued.

JAN. 12th. Pulse slower; cough and pain of the side easier; but still complains of a headach.

JAN. 13th. Pulse 94 in a minute; cough continues easier in the night, but is troublesome in the day-time.

JAN. 14th. Every way better; pulse only 80 in a minute. As her cough is still bound, ordered her, besides the medicines above mentioned, a pectoral decoction of *rad. alth. &c.*

JAN. 15th. Cough and other complaints in a great measure removed: Pulse 65 in a minute.

FROM this time her cough gave her little trouble; but on the 18th she complained of a pain in the *epigastrium*, with sickness at stomach, want of appetite, and a giddiness in her head, which were considerably relieved by a vomit, *infusum amarum*, and stomachic purges; and were almost wholly cured by the return of
her

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her *menfes* on the 5th of February, after an interval of eight weeks.

V. A girl of twenty-one months old, who had (December 1756) a great load of the small-pox, and not of a good kind, with a cough and obstructed breathing, was, on the seventh day from the eruption, blistered on the back; by which the pulse was lessened from 200 to 156 strokes in a minute. Next day her legs were also blistered, and the pulse thereby fell to 136. But the child's lungs being much oppressed, and her throat being so full of pustules that she could scarce swallow any thing, she died towards the end of the ninth day.

I could add several other cases of the remarkable effects of blisters in lessening the quickness of the pulse in coughs attended with fever, pain in the side, and pituitous infarction of the lungs: But those above may be sufficient to
put

put this matter out of doubt, as well as to remove any prejudice that may still remain against the free use of so efficacious a remedy.

IN a true peripneumony, especially where the inflammation is great, repeated bleeding is the principal remedy, and blisters early applied are not so proper. But when the peripneumony is of a mixed kind; when the lungs are not so much inflamed as loaded with a pituitous matter; when bleeding gives but little relief; when the pulse, though quick, is small; when the patient is little able to bear evacuations, and the disease has continued for a considerable time: In all these cases blistering will produce remarkable good effects, and, far from increasing, will generally lessen the frequency of the pulse, and fever, more speedily than any other remedy.

ON the other hand, when the fever and frequency of the pulse proceed from a true inflammation of the lungs, from

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large

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large obstructions tending to suppuration, or from an open ulcer in them, blisters will be of less use, nay, sometimes will do harm, except in the last case, where they, as well as issues and setons, are often beneficial, though seldom able to compleat a cure. But as in pituitous infarctions of the lungs, with cough and fever, repeated blisters applied to the back and sides are far preferable to issues or setons, so these last seem most proper in an open ulcer of the lungs. The former make a greater and more sudden derivation, and are therefore adapted to acute cases; the latter act more slowly, but for a much longer time, and are therefore best suited to chronic diseases. Further, while blisters evacuate chiefly the serous humours, issues and setons generally discharge true purulent matter, and on this account may be of greatest service in internal ulcers.

IN what manner blisters may lessen the fever and frequency of the pulse attending internal inflammations, I have elsewhere endeavoured

endeavoured to explain (*); and shall only add here, that in the cases above recited, where the quick pulse and feverishness proceeded more from a pituitous infarction than a true inflammation of the lungs, blisters, by relieving this organ, in some measure, of the load of humours oppressing it, would render the circulation through its vessels freer, and consequently lessen the quickness of the pulse and other feverish symptoms.

It may not, however, be improper briefly to point out the reason why blisters, which have been observed to be remarkably efficacious, even when early applied, in pleurifies †, are less so in true peripneumonies. This difference, I imagine, may be accounted for from there being no immediate communication between the pulmonary vessels and those of the sides and back, to which the blisters
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* *Physiological Essays*, p. 69.

† *Dr Pringle's Observations on the diseases of the army*, part 3. chap. 2.

are applied ; whereas the *pleura* and intercostal muscles are furnished with blood-vessels from the intercostal arteries, which also supply the teguments of the *thorax* : So that while a greater flow of serous humours, and also indeed of red blood, is derived into the vessels of the external parts, to which the vesicatories are applied, the force of the fluids in the vessels of the inflamed *pleura*, or intercostal muscles, must be considerably lessened. Further, as the intercostal muscles and *pleura* are, as well as the teguments of the *thorax*, supplied with nerves from the true intercostals, blisters applied to the back and sides may perhaps, on this account, also have a greater effect in relieving inflammations there than in the lungs, which have nerves from the eighth pair, and from the intercostals improperly so called.

Edinburgh, May 23.

1757.

EX-

E X T R A C T

O F A

L E T T E R

F R O M

Dr WHYTT, Profeffor of Medicine in
the Univerfity of Edinburgh, and
F. R. S. to Dr PRINGLE, F. R. S.

Edinburgh, 10th Nov. 1757.

WHAT you remark with regard to
blisters being freely ufed by the phy-
ficians at London, in the cafes mentioned
in the paper I laft fent you, is very juft,
and indeed what I knew; but although
their efficacy in fuch circumftances is
now generally acknowledged both in
England and Scotland, yet I do not re-
member that their remarkable quality in
leffening

lessening the quickness of the pulse has been particularly attended to. This, therefore, I thought it might not be amiss to ascertain by a few careful observations.

I agree intirely with you, as to the use of blisters in fevers; being of opinion, that when there is no particular part obstructed or inflamed, they are of little service, and sometimes hurtful, unless perhaps towards the end, when the pulse begins to sink. Nay, in fevers, where the substance of the brain is affected, and not its membranes, I have never found any sensible benefit from blisters: And I always suspect the brain itself affected, when a fever and *delirium* come on without any preceeding headach, or redness in the *tunica albuginea* of the eyes. This kind of fever I have met with several times, and have observed it to be generally fatal.

T H E E N D.





A P P E N D I X *.

An ACCOUNT of an Epidemic Distemper at Edinburgh, and several other parts in the South of Scotland, in the Autumn of 1758; in a Letter to Dr Pringle †.

Edinburgh, Nov. 10. 1758.

THE month of May, this year, was remarkably dry and hot. June was cold and dry. In July and August, we had but just as much rain as was sufficient to bring forward the fruits of the earth: the air was temperate, or perhaps a little warmer than is common in Scotland during those months. Towards the

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* The two following papers having been omitted in making the collection, they are here inserted by way of appendix. And as the contents was printed before these papers, it is hoped, that the reader will excuse his not finding in it any references to them.

† First published in vol. 2. of the London Medical Observations and Inquiries, in the year 1762.

end of August, and for the first week of September, the weather was warmer than usual in that season; but less so than at the same time in the preceding year. From the 8th to the 16th of September it was mild. From the 16th to the 20th, we had a strong easterly wind, which, though not extremely cold, yet cooled the air considerably. During the whole month of September, and till the 8th of October, we had scarce a shower sufficient to lay the dust. On the 8th of that month, we had a violent wind from the north-east with rain, which continued thirty hours. From the 8th to the 26th the weather was mostly clear and frosty, with some gentle breezes. From the 28th of October to the 8th of this month, the winds have been southerly, and accompanied with wet.

DURING the months of July, August, September, and October, the wind blew more from the east than ever had been known before in this country, at that time
of

of the year. In August and September, we had seldom any strong winds from the west as usual; from whatever point they came, they were moderate; and although it was calm weather for many days together, yet, as far as I can recollect, there was not one foggy day during the autumn. The barometer was higher throughout September, and the greatest part of October, than ordinary.

I thought it proper to lay before you this account of the weather, in order to judge how far any of the sensible changes of the air might influence the health of the people here. But, for my part, considering how remarkably mild and dry our season was, I can hardly ascribe the rise of our epidemic to any of the known qualities of the air.

BEFORE I proceed to the description of that distemper, it may be proper to take notice, that, during the months of July and August, a fever, with a bloody flux, raged in Lorn, and other parts of Argyle-shire;

shire ; and was not only mortal among the common people, but carried off several persons of a higher rank. The same disease prevailed no less at Newcastle upon Tyne, in August and September ; and likewise at Haddington *, about the same time, but in a less degree. In the months of September and October, we had a bad sort of small-pox at Edinburgh, and in other parts of this country. In some parishes near Cupar in Fife, eight died out of twenty-eight ; and in some parts of Teviotdale, three or four died for one that recovered.

As for what I call the epidemic, it was first taken notice of in this city, soon after the change of the weather, upon the easterly winds, that blew from the 16th to the 20th of September: Several children began then to be affected with a slight degree of fever, attended with the common symptoms of a cold ; but this was not thought extraordinary at that season

* A town within twelve computed miles of Edinburgh.

son of the year. About the end of September, the distemper grew much more general, both here and in the neighbourhood; and in the last week of that month, in the space of two or three days, thirty boys out of sixty, at the grammar-school of Dalkeith *, were seized with it. In the beginning of October, the sickness became still more frequent at Edinburgh, Dalkeith, and throughout a great part of the Lothians †. Old as well as young were taken ill: Nay, even women in child-bed, who were not exposed to the cold air, were affected; and in particular, I knew one, who had but just recovered of a dangerous fever after her delivery.

THE sickness continued to increase in all the places above mentioned, till about the 24th of October, when it began to abate: But whether the decline was owing to any alteration in the air, or because the distemper had already seized most people,

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* A village four miles from Edinburgh.

† The shire of Edinburgh, and the two adjacent shires, so called.

I cannot determine; though the latter seems more probable, as I am persuaded, that in Edinburgh, and the neighbourhood, not one out of six or seven escaped; and I am assured, that in some places it was still more general.

HITHERTO I have only mentioned the rise and progress of this epidemic here and in the places adjacent. I shall now, as far as I have been able to learn, inform you of the time of its appearance in other parts of the country. In Fife, about Kirkaldy, it was not observed till the first week of October: At St. Andrew's, not till the 10th or 12th of that month. In Angus, it began sooner. In Perthshire, it raged most between the middle and end of October; and many died of it. In the shire of Air, and at Glasgow, it was at the worst after the middle of October. In Teviotdale, it began later. At Ormiston, a village only four miles from Dalkeith, it did not appear before the 15th of October. And

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at Whitburn, about half way between Edinburgh and Glasgow, it was little taken notice of, till towards the end of that month. I have been informed, that the same kind of illness prevailed through Aberdeenshire, and other parts in the North; but that, at the end of October, it had not reached the shire of Ross. A gentleman told me, that in the Carse of Gowrie *, in the month of September, before this disease was perceived, the horses were observed to be more than usually affected with a cold and a cough.

HAVING given you this summary account of the epidemic, I shall now more particularly describe the symptoms. In general, people were differently affected. Some complained first of a slight sore throat, with a feverishness; and, after a few days, they were seized with a cough. Many had a heavy dull pain in their forehead, with watery eyes; either a sneezing
or

* The name of a large vale, on the north side of the river Tay, in Perthshire.

or discharge at the nose; but with little fever. Some, all at once, felt a foreness in the inside of the *trachea*, as if that part had been excoriated. Others had a hard dry cough, without this foreness; but generally with a quick pulse. Several were attacked with a slight *diarrhœa*; and others with bleedings at the nose, sometimes profuse, and continuing for several days; till either by the hæmorrhage, or by opening a vein, the pulse returned to its natural state: For in all those who had this symptom, the pulse was not only quick, but, for the most part, remarkably full. Two of my patients were troubled with a severe pain over their whole head, but had little or no fever. In one, the head-ach becoming periodical, went off upon lying a-bed, encouraging perspiration, and taking an electuary of the bark, with some glasses of claret: This person having weak nerves, could not bear evacuations. The other had his whole head blistered; leeches applied to the temples;

ples ; took camphire, *tinctura sacra*, and *laudanum* ; but with little benefit. Sudorific boluses of *gum. guaiac.* with *sal ammoniac. volat.* seemed to do him most service. After taking a few doses of this medicine, the pain left his head, and seized the loins and right thigh, but more slightly, and then went off gradually ; from whence it appears, that those pains were of the rheumatic kind. Some complained of pains only in the cheek-bones, teeth, and sides of their head. Others had a fever without a head-ach, sore throat, or cough, or indeed any other symptom, in the beginning : But when the fever began to abate, as it usually did in a few days, if the patient lay a-bed, more or less of a cough succeeded. In two patients, the cough seemed to be critical ; for it no sooner took place, than the pulse returned almost to its natural state. One of them, a married lady, aged about thirty, had been feverish for four days ; a rash or scarlet eruption appeared, but did

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not

not come fully out; and as she was restless and uneasy, I was sent for about ten at night. Her pulse then beat 120 times in a minute, and was full; but as she had a moisture on her skin, I delayed ordering her any medicine, till I should see her again in the morning. About midnight she was seized with a troublesome tickling cough, which hindered her from sleeping. At half an hour past four, being called upon to see her, I found her skin cooler, her pulse less full, and beating only 96 times in a minute. After this she slept; and at eight in the morning, I found her pulse down at eighty. Here it should seem, that the morbid matter, not thrown off by the skin, had fallen upon the *trachea*; so that the cough might be said to have been truly critical. Few, upon being taken ill, complained of any coldness or shivering, commonly the first feverish symptoms: However there were some, who were seized in a more violent manner, and with the *horror febrilis*; especially

ſpecially when, from want of care, they had a relapſe, which was often much more ſevere than the firſt attack.

IN regard to your queſtion, whether the diſtemper was infectious or not? As far as I have obſerved myſelf, or been informed by others, our epidemic did not ſpread by contagion, from one perſon to another, like the plague, ſmall-pox, or meaſles; but ſeemed to be owing to ſome particular quality of the air. Thoſe who attended the ſick, were not more liable to be affected than others; and I myſelf eſcaped, notwithſtanding my viſiting many of the ſick, and being obliged to travel frequently into the country, and ſometimes in the night. I had no opportunity to obſerve, whether nurſes infected the children they ſuckled, or the infants their nurſes; but I do not believe they did, from what I remarked in other caſes.

As to the cure. In the beginning, when the diſeaſe was mildeſt, it generally yielded to lying in bed, keeping the body open with clyſters, and promoting ſweat by
warm

warm diluent liquors. Afterwards, a higher degree of fever, which many had, required bleeding; and then the blood was almost always fizy, even in those who had no fixed pain, nor any considerable symptom, except heat, and a quick pulse. In some, especially among the country-people, the coat of the blood, instead of being tough, thick, and fizy, was transparent like a jelly; the *crassamentum* was of a loose texture, and separated but little *serum*. For the cough, and soreness of the *trachea*, the usual medicines were ordered: But when the patients only complained of a dry tickling cough, attended with little or no fever, a dose of *laudanum* at bed-time was the best remedy.

THOSE who exposed themselves too soon to the cold, before they had perfectly recovered, frequently relapsed, were often worse than at the first attack, and generally required more bleeding. Many were so slightly affected, as to need no medicine at all.

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FEW died of the disease, especially when it first appeared, except some old people; or those whose lungs had been greatly obstructed, or long pressed with phlegm. In such cases, besides bleeding, when the pulse required it, blisters and boluses of gum. *Ammoniac.* with *sal. Ammoniac.* *vol.* were the chief remedies I used, with a slight pectoral decoction, or infusion, acidulated with vinegar.

TOWARDS the end of October, and in the beginning of November, the distemper, especially if neglected at first, became more dangerous, by falling on the lungs, *pleura*, or muscles of the *thorax*. Then repeated bleedings were requisite; and afterwards, blisters to the parts affected had remarkable good success.

IN some parts of the country, when the disease was not taken care of in the beginning, as being attended with no alarming symptoms, it assumed the form of a slow fever, which sometimes proved mortal.

EXTRACTS of several LETTERS to
Dr PRINGLE, relating to the use of
the SUBLIMATE, in the cure of Phagedænic Ulcers *.

Extract of a Letter, dated Edinburgh,
January 15. 1757.

WE have had several instances here, of carcinomatous or phagedænic ulcers of the face, cured by the Baron Van Swieten's medicine for the *lues venerea*; I mean the solution of the corrosive sublimate in malt spirits †. We give it from one to two table-spoonfuls a day; and also direct the sores to be washed with it. In one instance, by the internal use only, it cured a person, whose

* First published in vol. 2. of the London Medical Observations and Inquiries, in the year 1762.

† Dr. Whytt always supposes this medicine to be made according to the proportions mentioned in the first volume of the London Medical Observations and Inquiries.

whole

whole face was over-run with a sore of this kind ; but the cure was not performed till after three months ; during which time, the patient took between two and three quarts of that medicine.

Extract of a Letter, dated Edinburgh,
March 17. 1757.

YOU having observed, in a former letter, that the word *phagedenic* was of a very vague signification, I have inclosed the cases of two patients, taken from the register of the Royal Infirmary : The one, of a carcinomatous ulcer on the cheek and nose ; the other, of an ulcer in the leg, of that kind commonly called scorbutic, which were both cured by the solution. We had another instance of the efficacy of that medicine still more remarkable. A woman of Dalkeith, about fourteen years ago, happened to
scratch

scratch a scab, or wart that grew on one of her temples ; upon which, an inflammation or forenefs of the part enfued, fpreading over the whole face, eating away great part of the lips, and the point of the nofe ; and running down upon the fkin of her neck to the clavicle. This woman, by uſing three or four quarts of that mercurial, was, in the ſpace of three or four months, to appearance, cured ; though the ſkin of her face ſtill looked as parts commonly do, after having been ſeverely burnt †.

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* Dr Whytt gives the ſequel of this caſe, in a letter dated the 11th of November 1758, in theſe words: “ The
 “ woman of Dalkeith, whoſe head, face, and breaſt were
 “ over-run with a *herpes exedens*, or phagedænic ſore, was
 “ to appearance quite cured by the ſublimate ; yet after
 “ diſcontinuing it for ſome conſiderable time, the ſore be-
 “ gan to break out again, but was ſoon checked, by re-
 “ turning to the uſe of the ſolution ; ſince which, ſhe has
 “ been frequently threatened with a relapſe, but has al-
 “ ways been able to prevent it by having recourſe to her
 “ medicine.”

I shall only trouble you at present with another case, of a man about 57, who was a patient of my own, and had a kind of cancerous ulcer on his nose, near the inner angle of the eye. He had spit three weeks with the *pil. mercurial. Pharm. Edinb.* during which time the sore became manifestly worse. I made him wash the part frequently every day, at first with the common solution; and afterwards, with a stronger preparation of the same kind, *viz. scrup. i.* of the sublimate to a pint of spirits. At the end of three or four weeks, the greatest part of the sore looked better, had less of a granulated substance, and seemed to be growing well; but in other parts it appeared rather to spread. As he was going to the country, I gave him a quart of the medicine for internal use, and a stronger solution for external application; but since that time I have heard nothing of him. The sore which this man had, was

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of

of the kind called *herpes exedens*, *nome*, *noli me tangere*, or *ulcus depascens* *.

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* Dr Whytt, in a letter dated 30th of April 1757, informed Dr Pringle, “ That the same patient having been
“ with him two days before, he had been surpris’d to see
“ such a change on the sore for the better. That the rug-
“ ged malignant appearance was quite gone ; and that in-
“ stead of *ichor*, the sore afforded a thick, white, and well
“ concocted matter ; had the colour of the most benign ul-
“ cer ; and was contracted to less than half its former di-
“ mensions. That the patient having returned to the in-
“ ternal use of the solution, had taken another quart, at
“ the rate of a spoonful morning and evening. That the
“ medicine did not bring on a spitting, nor was attended
“ with any other inconvenience. That, at the same time,
“ he continued to wash the sore, twice a day, with the
“ strong solution : And that, in order to obtain a complete
“ cure, the patient was directed to continue the medi-
“ cine for six weeks or two months longer, if the part was
“ not healed before that time.”

Dr Whytt added, in a subsequent letter, “ The man
“ who had the cancerous sore, or *noli me tangere*, on the
“ *os unguis* of the right side of the nose, grew much better
“ by the internal use of the sublimate ; but as he lived at
“ too great a distance from Edinburgh, he could not be
“ supplied with a fresh quantity, when he had exhausted
“ that which he carried with him. However, by washing
“ the sore daily with the stronger solution, he had conti-
“ nued a twelvemonth without growing worse,”

IT would seem from this last case, compared with the others, that the solution has greater effects in curing these malignant ulcerations, when taken inwardly, than when used only as a topical medicine: from which one would be apt to conclude, that such sores do not entirely depend on a morbid state of the part affected, but also on some fault in the blood, which being corrected by the sublimate, the ulcers are soon healed.

The two cases referred to by Dr WHYTT, taken from the register of the Royal Infirmary.

C A S E I.

EDINBURGH, Nov. 21. 1757. WILLIAM KERMOTH, aged 28 years, had several ulcers of a carcinomatous nature, on his cheek, nose, and upper lip. The ulcer on the upper lip had eat quite through,

through, and the parts all about it were hard, and considerably swelled. That on the cheek, run up on the side of the nose, very near as far as the internal *canthus* of the eye; a spreading inflammation, and thick hard scabs, were observable all round the ulcers; and they discharged a thick whitish matter in small quantity, but of an offensive smell. He said they were occasioned by his falling under some heavy load, by which he hurt his face.

At first, an emollient cataplasm was applied to his cheek; and he took the *decoct. tamarind. cum trip. senn.* for a purge. Then he was put into a course of the solution of the sublimate, taking one spoonful morning and evening, with the *decoct. lignor. Pharm. Edinb. lib. ii.* daily. For the first three days, these medicines gripped him, and occasioned a pain in his stomach; upon which they were intermitted, and he took, at bed-time, a bolus of twenty-five grains of rhubarb, with sixteen drops of *laudan.* which removing
the

the gripes, he went on with the solution for about three weeks, when a swelling was observed on his right nostril, and upper lip. His medicine was again intermitted, and took a bolus of jalap with calomel. The swelling going off in three days, the solution was renewed, and continued for about twenty-six days longer. By this time, the ulcer was almost entirely healed; but some hardness and swelling still remaining upon the lip, the medicine was again interrupted, and, for six weeks, the patient was ordered the *pil. mercurial. laxant. Pharm. Edinb.* in the dose of *drach. ℥s.* every other night; after which, he seemed to be perfectly cured: For the ulcer skinned over, and nothing but a little hardness remained upon the side of the lip. He had no spitting during the long use of these mercurials.

C A S E

C A S E II.

EDINBURGH, September 12. 1756.
 Peter Morifon, aged 56 years, about five years before his admission, had a *cachectic* * ulcer upon the inner angle of the left leg, which was apparently cured, but broke out again a few weeks after, and was never thoroughly healed; though, when he came into the Infirmary, the fore was contracted, superficial, and scarce discharged any matter. The whole leg was considerably swelled, especially towards night; the parts around were hard and itchy, but never painful. He had also some asthmatic complaints.

AFTER the patient was admitted, and was using some medicines for his asthma, a common caustic was applied to the fore.
 When

* By a *cachectic* ulcer, is meant, one of those ill-conditioned sores with livid edges, commonly, but improperly, called scorbutic.

When the eschar was thrown off, an ulcer appeared, about four inches in length, and two in breadth, with the edges blue and callous. By the constant use of fomentations, the swelling of the leg was considerably diminished; but though he took mercurial purges, had the edges of the ulcer frequently scarified, dressed with *ung. Arcei*, and washed with the tincture of myrrh, yet it continued in much the same condition. He took vomits of *ipe-cacuanha*, squill-mixtures, tar-water, and was blistered for his asthmatic disorder, but without success.

ABOUT the 12th of February 1757, he began to take Van Swieten's solution of sublimated mercury, to *unc. ℥ss.* morning and evening, which agreed very well with him, made him sweat plentifully, and considerably increased the quantity of his urine. By thirty days use of the medicine, the sore healed up, though the skin remained tender; but the cough, difficulty

culty in breathing, and pain in the breast, continued.

Extract of a Letter, dated Edinburgh,
Nov. 10. 1757.

THE solution of corrosive sublimate lately dissolved, in a short time, a glandular knot, which rose on the under part of the lower jaw, after cutting off a cancerous lip. Mr George Cleghorn, of Dublin, writes to me, that this medicine has been very successful in venereal cases; but he mentions an observation, which is new to me, *viz.* that in patients who are under no confinement, and walk abroad, the mouth is seldom affected; and the evacuation by the skin and kidneys, is much less than in those who keep the house. He adds however, that the former are longer in being cured than the latter.

Extract

Extract of a Letter, dated Edinburgh,
Jan. 27. 1759.

SINCE I wrote to you last, I received the inclosed account of the effects of the sublimate in the case of Margaret Bruce, whom I saw at Cramond in November last; at which time I examined all the parts that had been once sore, but were then perfectly healed by the use of that medicine, given her by Mr Spotiswood, surgeon of that place. Although that gentleman's account of the cure would have been satisfactory enough, yet I had the truth of it confirmed by the Reverend Mr Gilbert Hamilton, minister of the parish; who, after reading the case drawn up by Mr Spotiswood, delivered it to me. As this is one of the strongest instances of the efficacy of the sublimate, in curing those obstinate ulcers of the phagedænic kind, I thought it would be agreeable to you, to have the whole account

as it was delivered to me, with Mr Spotifwood's letter on that occasion.

Copy of Mr Spotifwood's Letter to Dr
Whytt; dated Cramond, Dec. 9.
1758.

S I R,

IN compliance with your request, I have sent you, inclosed, an account of the effects of the sublimate in the case of Margaret Bruce, in which they were more remarkable than in any that I have yet seen.

I shall take this opportunity to acquaint you, that I have another patient, who, since the 17th of August last, has used fifty-six grains of that medicine. Before he began, he had a very fordid ulcer in his nose, by which the whole *septum narium* was eat away; the nose was swelled and painful, with a redness and inflammation externally. He had not taken

ken seven grains, before he was eased of the pain, and the sore had a better appearance. I washed the parts with *aq. calcis* and *mel. rosar.* and dressed the ulcer with dry lint. By continuing this course, the discharge was lessened, a stop was put to the corrosion, and the ulcer was cleansed: But the external parts inflamed and suppurated, first on one side of the nose, then on the other; and the two ulcers joining, most of the nasal bones came away. How this case may end, I cannot foresee; but this I think remarkable, whenever the sublimite is intermitted, the parts become more painful, discharge a greater quantity, and produce some bad *fungi*; but upon repeating that medicine, the appearances soon grow better. This man, by trade a miller, has scarce lost an hour's work, or one meal, during the use of the mercurial. He took it when at harvest-work, and is still taking it, notwithstanding the coldness of the season. He complains
of

of being qualmish after each dose. It acts as a laxative; but as for other evacuations, either by sweat, urine, or *saliva*, they are scarce more than natural. He has a wife and several children all healthy; and I can see no reason to suspect any venereal taint.

I am, SIR, &c.

R. SPOTISWOOD.

The Case of Margaret Bruce, referred
to in the above Letter.

MARGARET BRUCE, a young woman of this parish, of mean condition, enjoyed a good state of health, till the 18th year of her age, when she was seized with convulsions of the epileptic kind, and other ailments. In January 1755, when she was twenty-two, she complained of violent pains in her right leg, attended with a hardness and swelling but
without

without any appearance of matter, or inflammation. After several fruitless applications, I laid a blister along the *fibula*, which seemed to be the principal seat of the pain; but the blistered part, instead of healing, degenerated into a foul ulcer, which I could never bring to a good digestion; for it continually produced a whitish slough, which, if removed, was sure to return in two days.

IN the month of May following, my patient was sent to the Royal Infirmary at Edinburgh, where she staid five months; and, during that time, had the fore regularly dressed, and all means used to cure it. Among other attempts, the whole ulcerated part was destroyed by a caustic, and forty peas put into the cavity: She took many purges with calomel, the mercurial pills of the Edinburgh Dispensatory, and a decoction of the woods. But none of these medicines had any other effect than to make her void several worms; so
that

that she was dismissed about the middle of October not cured.

IN the end of February 1756, she was again sent to the Infirmary, where she continued upwards of three months, and was ordered some mercurial laxative pills, which affecting her mouth, she spit, for some time, three pounds a day. She had an issue put in the inside of the lame leg, which gradually widening, came at last to hold thirty peas. She was dismissed again in the beginning of June, in a better condition, but still far from being cured.

AFTER this, she used various other remedies, and, among others, sea-water, for a considerable time, but without any benefit. At last observing, that none of all these methods promised a cure, I luckily thought of the sublimate, as having had some experience of its good effects in similar cases. But, previous to the account of its success here, it may be proper to describe more particularly the state
in

in which the patient was, when she began to use this medicine.

THE oldest sore, which broke out in January 1755, about three inches above the *malleolus externus*, upon the *fibula* of the right leg, was not broader than a crown piece, but had large callous edges, and the muscular parts beyond them felt hard: This ulcer was round and foul at the bottom, without any great discharge; the *fungus*, which arose from it, though frequently cut away, was renewed in a few days.

THE issue, made at the ordinary place, on the inside of the same leg, by the number of peas, and length of time, had fallen much lower, and had degenerated into a fordid ulcer, of the shape of the figure 8, and with the same kind of indurations around it as in the other.

ABOUT May 1756, a glandular tumour, very painful, was formed at the upper part, and upon the inside, of the thigh of the same side, which was sometimes
larger

larger and more uneasy than at other times.

IN October 1757, a sore broke out upon the breast of the same side: This was superficial, without any hardness about it, but always foul, and could not be healed.

IN June 1758, two new ulcers broke out upon the same leg, which, though small, were also always foul, and could not be cicatrized.

AROUND these sores, and indeed almost all over the leg, the skin was of a blackish colour, with scurfs and scales, which soap and water could not remove. The whole leg was swelled, and felt hard; the patient complained of pains striking through it; she could not extend it, (tho' the tendons were not contracted), but went on crutches, with the limb suspended, since May 1756. Notwithstanding all these ailments, the want of exercise, and her low circumstances, (for she was maintained by the parish), the patient kept up her
flesh,

flesh, and was otherwise in better health than could have been expected.

UPON the 14th of September last, I began the sublimite in this manner. I dissolved seven grains in eight ounces of spring-water, and gave morning and evening a spoonful of this solution. The whole was taken in eight days. After three days intermission, the same quantity was renewed, and continued for seven days longer, when the *menfes* coming at the usual time, I forbore giving her the remaining ounce, till she was in a proper condition to take it; and, on that account, she was five days without any medicine. She vomited after the two first doses; and all the rest occasioned a *nausea* and sickness, with a burning heat from her stomach to her throat, but no vomiting. She had few stools, till the third day after taking the solution; but, from that time, she had more or less of a purging; some days, six or seven motions, on others, not half that number. She sometimes com-

B b

plained

plained of sharp gripings, but more generally of a rumbling in the bowels. After the second dose, a copious sweat broke out, particularly on the fore leg, which was never known to perspire before. From the fourth day after she began the solution, she spit about three or four pounds a day; but although she complained of a pain in her teeth, her tongue, and *fauces*, yet the swelling of those parts was much less than what is observed in a salivation raised by calomel, and her breath was much less offensive. In five days after she began the course, she made twice her usual quantity of water, which was of a deep colour, and deposited a large sediment.

ALL these evacuations, *viz.* the stools, the profuse sweats, the increased quantity of urine, and the spitting, not only continued while she was using the medicine, but for a fortnight after.

THE effects it had upon the ulcers were no less remarkable. In four days from
her

her beginning, the two fores that had broke out last upon her leg, and that on her breast, were perfectly healed; the other two ulcers on the leg looked cleaner, the callous edges, and hardnesses round them were diminished, the blackness of the skin disappeared, the muscles felt softer, the glandular tumour was less, and the patient said, she had not been so easy and free from pain since the first breaking out of her fores. In short, in eleven days from the use of the sublimate, the two remaining ulcers were perfectly healed, and all the dressings removed: After which, the skin, where the fores had been, cast off several different crusts or coats, and the cure was compleated.

THE patient was much weakened by her great evacuations; but she has now recovered a good degree of strength, the skin is whole, the leg without swelling or pain, and she walks without any support.



*To The Medical Library
University of Glasgow
from the author*

PRACTICAL OBSERVATIONS

ON THE

INTERMITTENT FEVER OF PERU.

SUBMITTED TO THE

MEDICAL FACULTY OF THE UNIVERSITY OF GLASGOW.

BY

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"Nullum se cognovisse remedium, quin solo tempestivo usu tale fieret."—Boerhaave.

GLASGOW: JAMES HEDDERWICK & SON,

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1842.

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INTRODUCTORY REMARKS.

WHILE in Peru, I had ample opportunities for observing Intermittent Fever, in all the types of that singular disease. I left London for Peru in 1825; and, during several years, was engaged in extensive practice, both civil and military; for, besides attending the English and other foreign residents in the towns of Tacna and Arica, I was much employed by the Spanish American population, and for a considerable period had to take charge of large bodies of troops, and the military hospital in Tacna: which city is the capital of the province, and distant 40 miles from the seaport town of Arica. After residing chiefly at Tacna, during some years, and having visited Europe, I returned to Peru, and was again engaged in practice in Tacna, during the years 1833-34-35. When opportunity offered, I crossed the Andes, and visited some of the more notable localities in that extraordinary portion of the globe: one journey included a circuit of nearly 2,000 miles, in which the cities of Oruro, Potosi, Chuquisaca, and Arequipa, were seen, and other places where Intermittent Fever prevails. It may also be stated, that, so far as is known, I was the first practitioner who recommended the use of oleum ricini to the native population in the province of Tacna or Arica. This may seem more worthy of notice, now it is known that the Palma Christi grows in the valley of Asapa, near Arica. Prior to my arrival in Peru,

the sulphate of quinine was either unknown among the people in the province of Tacna, or it had been given in a few cases only by a casual visitor. The price which was paid for quinine in Peru, about that time, was enormous. In 1827, what I took from London being exhausted, some was purchased from a vessel then at Arica, for which I paid 25 silver dollars, or above five pounds sterling per ounce; and in March 1828, the wholesale price of the sulphate of quinine, in Lima, "very much adulterated," was twice its weight in gold, being 34 dollars per ounce: but when in Lima, in 1836, I was then offered there sulphate of quinine at *three* dollars an ounce.

In such a country as Peru, it is hardly possible to obtain correct statistical information on any subject; the vast extent of territory and scattered population—its condition, as relates to education, insulation, and other circumstances, all combine to frustrate the attempts of the statist or philanthropist, who endeavours to meliorate or remove existing evils. Though Peru and Bolivia include an extent of country equal to above nine hundred thousand square miles, being more than ten times the whole island of Great Britain, yet the whole population is within three millions, or little more than that of Scotland at the present time. The average number of deaths annually in Peru, is much greater than is experienced in the temperate climes of Europe; for though, in the former, the prudential or preventive checks to population, which have been noted by Malthus, are almost inoperative, yet some of his positive checks are terribly effective; for in that vast region, which is the scene of the following Essay, the yearly deaths are understood to be not less than six per cent. of the whole population. This rate of mortality is known to be that of Lima, the capital of the state, for there, one out of every seventeen dies annually; and there is every reason to believe, that in most other districts along the coast, it is not any less, being three times that of London, and four times that of some rural districts in Britain. Various attempts

were made to obtain statistical reports on a number of interesting topics, but in vain; one only was given to me, which is a list of births, deaths, and marriages, for the year 1834, in a parish in S. Peru, in a comparatively healthy locality, the population of which was within 6,000:—

Births, . . .	{	Spaniards Baptised, . . .	62	
		Other Classes, . . .	293	
			<hr/>	355
Deaths, . . .	{	Adults,	199	
		Infants,	124	
			<hr/>	323
Marriages,				42

All who died under 7 years were classed as infants; but there is reason to believe, that the above report did not include the whole number of infants *buried*, for the rate of infantile mortality, among the lower classes in Peru, is very great—a result of bad management as relates to ingesta, want of cleanliness, &c. and they seldom desire any medical advice in infantile cases.

The properly qualified physician, who attempts to practise among the native population in Peru, must soon discover that he does not recline on a bed of roses. It is not only disease, often in some of its most appalling forms, which he has to encounter; neither is it journeys of 100 miles or more, and the consequent toilsome days and sleepless nights which, of course, are incident to practice in such a country: these are not the most annoying circumstances which must be grappled with by every one who would faithfully discharge his professional duties in Southern Peru.

It is necessary to contend with ignorance and deeply-rooted prejudice, on the one hand—with individual and class interests, on the other; all of which are combined, and brought to bear in active co-operation against any one who would innovate on the established modes of attempting to relieve suffering humanity.

Among Peruvians, there are many peculiar notions, or aphorisms, connected with the practice of medicine; a few of which it may be well to notice, both because

they have a noted influence on a large portion of those who practise the healing art in that region, and also, because there is reason to believe that the points of medical faith referred to, have a direct and powerful tendency to augment the annual mortality-bill in Peru, and thus inflict irreparable evil on the community.

A few only of these aphorisms will be here stated, such as, “son irritantes los purgantes,” *purgatives are irritants*; “veneno es el mercurio,” *mercury is poison*; “la sangre es la vida,” *the blood is the life*; “el enfermo evacua porque sana, y no sana porque evacua,” *the alvine discharge from the patient is the result, and not the cause, of his convalescence*.

Such are the sort of opinions entertained, not only among the people, but also by many of those gentlemen who take charge of the public health in Peru; who, without any want of charity, may be supposed to have derived such opinions more from tradition and musty records of olden times, than from observations made in the chambers of the sick, or the study of modern writers on the theory and practice of medicine.

In Peru, it is not expected that medical men should perform the operations of sanguineous depletion, or of dental surgery. Barbers are the operators in such cases; and if, in a case of emergency, a medical man does his duty, by operating instantaneously, he may lose caste among the vulgar, who will say, “el no es medico, barbéro no mas,” *he is only a barber!* Neither is it understood that a practitioner should dispense medicines; and in the present state of chemical and pharmaceutical knowledge there, the occasional consequences may easily be imagined. These remarks are not speculative, neither are they indited with any unkindly feeling; it is merely touching a subject which is fraught with most important results to Peruvian society.

Both climate and prejudice prevent *post mortem* inquiries; so that if those authors who are celebrated for their works on morbid anatomy, had lived in Peru, such works could not have been given to the world.

CAUSES

OF

INTERMITTENT FEVER IN PERU.

NEITHER the design nor the limits of this Essay will admit of a prolix inquiry into the remote, predisposing, and proximate causes of this division of the order Febres; but it is necessary briefly to notice some facts illustrative of the subject.

Though the coast of Peru, extending above 20 degrees of latitude, is within the torrid zone, yet the temperature is much lower than might be expected, more especially on the coast of Southern Peru, which is more immediately under consideration. Throughout the whole of that vast region, included between the mountains of the Western Cordillera on the one hand, and the Pacific Ocean on the other, Fahrenheit's thermometer is seldom seen so high as 90 in the shade. The average temperature of day and night, for several years, at Tacna, was 64. That city is in about 18 degrees south latitude, and stands in the desert between the Andes and the sea. The cause of such moderate heat, is the trade wind and the proximity of the Andes, many of whose summits are covered with perennial snow and ice; while the region under review is shaded from the beams of a tropical sun by dense clouds, which, during the greater part of the year,

envelope an immense tract of country in which Intermittent Fever prevails. Throughout that territory, there are a number of straths, or valleys, which extend from the mountains, more or less, towards the sea. Some of those valleys are beds of rivers, or torrents from the Andes, and are the only localities inhabited on the coast of Peru, that region being almost a continuous sandy desert; for in those vast solitudes between the valleys, there is no water, vegetation, nor inhabitants, neither is there beast, bird, reptile, nor insect, to be seen, nor anything which exhibits the principle of life; but the valleys where there is water, teem with life—there vegetation is exuberant; and at all seasons, vegetable matter is more or less in a state of decomposition.*

The vegetable malaria seems to be more concentrated and deadly at some localities than others; for the valleys of Moquegua, Tambo, and other places, which are inland, at a distance from the sea and above it, are peculiarly destructive of health. Thus it appears, that the pestiferous atmosphere of those places, cannot be a result of the decomposition of sea water, and the production of sulphurated hydrogen from that source, as is *supposed* to be the case on the west coast of Africa. Though drainage has proved useful on the Peruvian coast, as at Pisco and Arica, yet it appears, that a marshy soil is not requisite for the formation of the remote cause of Intermittent Fever.

The valley of Tambo, at the place where the river is commonly crossed, on the rout to Arequipa, is, with reason, dreaded by travellers, particularly during the months of Autumn. The writer was one of a party of eight men, who were obliged to remain a day and two nights at that fatal spot, in March 1828, seven of whom were attacked by Intermittent Fever at various dates, of from three days to three weeks, after leaving Tambo. There was no marsh at that place; but there were a number of cuts from the river

* Vide Note A.

for the conveyance of water to the sugar plantations in the vicinity. The soil at the halting station, appeared to consist of the decomposed vegetable matter of ages; and at some parts, slime was turned up by the horses' feet, which emitted a horrid, sickening stench, worse than that of animal matter in a state of putrefaction, and like to induce syncope in the rider. After sunrise, when on the rout from the place, a thick white haze was seen floating on the ground, to the height of several fathoms from the earth's surface; which haze probably contained the volatile vegetable matter, or exciting but hidden cause of Intermittent Fever, which was conveyed into the system through the medium of the gastric, or respiratory, or other organs of those subjected to its operation.

Both Remittent and Intermittent Fevers are endemic in some of the profound valleys (quebradas) among the Andes, at considerable elevations above the level of the sea, where heat and moisture are such as to exhibit vegetation and putrefaction of the same. I have seen ague in the profound valley of the Pilcomayo, and also in that of the Cachimayo. Both these rivers originate among the mountains of the eastern or great internal Cordillera of the Andes of Bolivia, near Potosi, and are sources of a branch of the great river Plate. Intermittent Fever, of a malignant type, is very prevalent in the province of Larecaga, on the banks of the Tipuani, at the part so much celebrated for the gold found in its channel. That river runs along the eastern slope of the Eastern Andes, and, uniting with the Beni, ultimately joins the great river Amazon. The gold washings are 400 miles inland from the Pacific Ocean; and a numerous population being resident there, Intermittent Fever and Dysentery are very fatal, notwithstanding its elevation.

Intermittent Fever is not endemic on any part of the immense region, or table-land, which lies between the Eastern and Western Cordilleras of the Andes in Bolivia. There, the climate is too rigorous; little vegetation of any sort is seen; and in some places

where barley is reared, it does not grain;* but cases of ephemeral ague may be seen. I have witnessed such cases in the cities of Oruro, Potosi, and Chuquisaca. The former place is 12,400 feet, and the house in which I lived in Potosi (Achavel's, in la calle de Comercio) is 13,500 feet above the sea; and in it I have seen Intermittent Fever. In such localities, the disease appears in those only who have had ague before, and have been at places where vegetable miasms exist. These attacks of ephemeral ague are induced by the depressing passions, bursts of anger, error in diet, or, in fine, by whatever has the effect of diminishing the energy of the nervous system. It is probable that the remote cause of Intermittent Fever is often created, both in streets and within doors, on the coast, or wherever vegetable matter is allowed to accumulate and putrify. In such circumstances, and in the absence of sanitary police, it is the duty of medical men, or any one who is aware of the evil, to denounce it, and recommend its removal.

Ague is not often seen among the crews of the numerous vessels which now frequent the coast of Peru. They generally sleep on board, and thus escape the malady. Were the poison of miasmata susceptible of being conveyed by wind to even a fraction of the distance mentioned by a late writer on malaria,† we should see its effects more frequently on board the vessels which remain at anchor in the roadstead of Arica, where they, in some cases, are during months within half-a-mile of the land; but perhaps the want of moisture in the air is the cause why miasmata, on this coast, are not more transportable by the land breeze. Europeans, on their first arrival in Peru, are not so liable to Intermittent Fever, as they are after a residence of some time in the country. Prior to the poison taking effect, it seems that a weakening process must have been going on, that the energies of the system must have been diminished, before the effects

* *Vide* Note B.

† *Vide* M'Culloch.

of the malaria are developed. It appears to operate more readily on those persons who are predisposed by exhaustion, fatigue in travelling, defective nutrition, the depressing passions, or any sort of intemperance. The disease is most apt to attack those who travel along the coast of that region, who have to endure excessive fatigue and privation both from want of good food, and bad water; also, sleeping on the ground, and other circumstances, which predispose the system for the reception of the poison; and, unfortunately, it is experienced at the only places where travellers can in most cases halt during the night. Troops are peculiarly exposed to the remote cause of Intermittent Fever in Peru: they have to travel on foot, in that debilitating climate, carrying arms, &c. and often sleeping on the ground, which is most injurious, and, if possible, ought always to be avoided. Troops, more especially after defeat, or when baffled in military operations, have exhibited Intermittent Fever and Dysentery in their most aggravated forms.

It may not be expedient here to enlarge on the proximate cause of Intermittent Fever. Whether it consists in a morbid state of the capillaries, or is an affection of the nerves, by the operation of the poison of malaria on the respiratory system, supposed to come from the medulla spinalis, and of those which govern the circulation, that is, the ganglionic, or great sympathetic, may best appear by merely noting the symptoms of the disease.

SYMPTOMS OF INTERMITTENT FEVER IN PERU.

The symptoms of this branch of the class *Pyrexia*, as seen in Peru, are exceedingly varied in different individuals—a result of idiosyncrasy and other circumstances; for though those who suffer from ague there, generally exhibit the cold, the hot, and the sweating stages of the disease, yet these are much modified by a variety of causes, which will appear more fully in the sequel. The intelligent practitioner

there, will soon know that he should act with caution in announcing his diagnosis, especially among the common people; for many cases of sickness, which at first seem slight, soon assume a very different aspect; and if he rashly answers in the negative, to the query that may be put to him at *first*, by the patient or others, “*hay terciana?*”—is it ague? he is apt to be considered by them, “*un ignorante, que no sabe-nada,*”—an ignoramus, who knows nothing.

Intermittent Fever there, is often accompanied with a diseased state of the hepatic system, either functional or organic, or both. It is seldom that in a case of ague there, the biliary vessels are in a healthy condition: there is a want of tone in the body generally, and, during the cold stage, there is defective secretion and excretion.

Many of the more ordinary ailments which, in the temperate zone, excite little apprehension, often terminate, in Peru, in severe ague. A common catarrh or pectoral affection, an attack of indigestion or a torpid state of the bowels, and other such like accidents, are often followed by Intermittent Fever. It also frequently happens, that the febrile affection, concomitant on acute inflammatory attacks, assumes the intermittent form, instead of the usual febrile type of the disease.

The symptoms of tertian ague are not, in general, so severe in old cases as in those of recent date; but the cases of quartan ague seen in South Peru, are often both of long duration and terribly severe.

The single tertion is most frequently experienced, and in many cases is exceedingly afflictive, not unfrequently assuming the quotidian form, and presenting a putrid type. It is worthy of notice, that the disease is generally met with under a much milder form in the north of Peru, and even in the latitude of Lima, which is in 12 degrees, than it is 5 or 6 degrees farther south: it is a saying among the people there, “*muy mortal es la terciana de Tambo,*”—*the ague of Tambo is very fatal*. Men are most subject

to ague in Peru, for obvious reasons; but both sexes, and of all ages, fall under it.

When one who has never had the disease is exposed to the remote cause, while on a journey, though it may appear ultimately that he has caught the distemper, yet the symptoms are seldom developed while the excitement necessarily attendant on travelling by horse or mule, in those regions, continues: it is not till after the system is in a state of quietude, when the malady becomes unmasked, and is exhibited in a form without dubiety.

The patient may have complained, for some days, of nausea and loss of appetite and a confined state of the bowels. Those are generally the first symptoms of the disease, after exposure to the remote cause. A peculiar sensation in the præcordia is felt; and in some cases, but not in all, there is a dull pain in the cerebral region, repugnance to locomotion, with occasional yawning and stretching of the body; and now the patient feels alarmed. When an attack of ague is expected, it is the custom there for persons who have suffered from it, or who may have learned from others, to look at the finger nails, which are of a blue or livid hue before an attack; they also touch the nose with the back of the hand, to ascertain that the former is preternaturally cold, which are sure symptoms of an approaching paroxysm. A sensation of cold now creeps over the body. This is felt more especially in the spinal region; and in the commencement of the cold stage, there is often a feeling of something like vermicular motion in the spinal column. At this period of the attack, the patient, in some cases, is affected with severe vomiting; but this symptom appears most frequently in those who have not had ague before. The cold now increases all over the external surface, and the patient is generally in the supine position; the fingers feeling cold, are turned into the palm of the hand, which is clenched; and for a time he endeavours to retain his teeth fixed, but is soon compelled to submit to the violent involuntary

motion of the lower jaw. The pulse, at the beginning of the attack, is quicker than usual, but yields, or rather it shrinks, to touch; and during the more advanced and severe period of the cold fit, it in many cases is scarcely, if at all, to be felt at the wrist. The skin presents a cold, dry, rough surface; the lips are pale, eyes sunk, and the breath is cold; the tongue, which rarely can be seen during the shivering, feels cold in the mouth, and is void of taste; its nervous papillæ seem to have lost their function, and the features are shrunk, so as, in some cases, completely to change the countenance, while the chattering of the teeth, and the convulsive movements of the body, are most distressing. The state of the respiratory organs, during the cold stage of a severe attack, is a phenomenon which merits the notice of the physiologist, and is an important feature of the disease. When the shivering begins, the patient feels a constricting pain in the region of the thorax, which gradually gets worse with the increased difficulty of breathing, which, in some cases, is almost totally obstructed. Every inspiration causes acute pain, so that the patient endeavours to hold his breath. The inspirations are exceedingly small and rapid; and when respiration is most impeded, there is excruciating pain felt in the region of the spinal canal. In some cases this pain was severe, as if caustic had been applied to the dorsal and lumbar regions; and at this period of the paroxysm, the urine has been involuntarily ejected from the bladder.

The dyspnœa and anxiety, with a feeble, short, dry cough, which during the cold fit are often experienced, cause great distress to the patient, and in some cases threaten a speedy termination to his sufferings; but gradually he feels less pain on inspiration, which is not so cramped; the circulation is again effective in the extreme vessels; and the urine is now voided, of a limpid appearance, but not in great quantity, while the other symptoms of this stage of the disease finally disappear. The duration and symptoms of the cold stage

depend much on various circumstances, such as age, the means at command for rendering proper aid, &c. Where the fit is allowed to run its course without assistance to the patient, it varies from half-an-hour to three hours or more.

This notice of the symptoms which are experienced in the cold stage of Intermittent Fever in Peru, is only an attempt to give a general idea of what has been observed. Though all these symptoms are not exhibited in every case, yet cases are seen, in which both the intensity and duration of the paroxysm exceeds what has been stated. A patient with ague, caught in Peru, has been seen on the deck of a vessel, and exposed, at his request, to the sun's rays at meridian, when about under the equator. In that position, with only the head shaded, he often remained several hours; and though heavily covered with clothes, suffered intensely from cold, dyspnoea, cough without expectoration, and pain in thorax and spinal region, feeling at times as if the thoracic and abdominal viscera had been drawn towards the spinal column; and when the shivering permitted, craved for hot drink to alleviate his sufferings from cold.

This patient was ill with ague several months after being on board. The case ultimately assumed the quotidian type, and seemed to yield to an alterative course of pill, hydrarg. and the continued use of a strong decoction of coffee, which was taken hot and without sugar.

HOT STAGE.

The symptoms of the hot fit are so uniform in their appearance, and so well known, it may not be necessary to notice them in detail. Almost all the functions which had been in a manner dormant during the cold fit, are now in active operation; and that activity seems to increase with the increased energies of the respiratory organs. One symptom, which must strike every one who sees it, is the immense secretion and

developement of heat, which is exhibited, during a longer or shorter period, subsequent to the cold stage. Whence all this evolution of caloric? Can it be, that the blood, during the cold stage, having retained or accumulated its carbon, that accumulation is now given out, and, in accordance with a well-known law in chemistry, a corresponding heat is evolved in the system? Whatever may be the cause, the effect is of great consequence to the patient, who soon exhibits strong febrile symptoms, and the cerebral system is more or less affected. It is a notable circumstance, that, while during the cold stage the intellectual functions remain clear and collected, a marked difference now appears, for in very many cases delirium supervenes; and in almost every one in which the febrile symptoms are fully developed, the intellect is more or less obscured for a time. The first symptoms of the hot fit are, that the respiration becomes easier, and the pulse slowly increases in strength; the skin grows warm, but is still dry; the lips resume their natural appearance, and the countenance brightens. When the circulation has been re-established, the patient complains of pain in head and thirst, and desires cold drink, of which, if permitted, he would take more than it is proper to allow: there is now a copious flow of urine, which is highly coloured, and a brown-coloured sediment is precipitated.

The hot stage continues a longer or shorter time, according to circumstances, such as, proper medical treatment or otherwise—due attention to the patient by nurses; and, of course, much depends on the attack being of a mild or virulent nature.

SWEATING STAGE.

The hot fit disappears in that which follows, so gradually, that the patient is often not aware of perspiration on his face, till informed of the good news by those in attendance, and the now rapid diminution of the febrile symptoms.

The skin becomes cool; thirst is much lessened; the pulse is more natural, and the cerebral organ is now free of pain. The urine is voided in great quantity, and a copious alvine discharge is sometimes experienced, which is a favourable symptom; and, in some cases, the disease terminates in diarrhœa biliosa. The perspiration occasionally is excessive, and the smell is exceedingly offensive. The sweating stage continues, in some cases, during many hours—particularly so in the quartan type; and the patient often exhibits great prostration of strength at the termination of the fit, and requires to be assiduously watched: but in many cases he is able to attend to his ordinary business until the period of another paroxysm, which ought, if possible, to be prevented, and the morbid concatenation broken by proper treatment,—which will now be considered.

TREATMENT OF INTERMITTENT FEVER IN PERU.

Intermittent Fever in Peru, is presented in such a variety of forms, as to require from the physician the most vigilant attention, that he may be able to adapt his practice to the varied aspects in which the disease is exhibited to view.

The people of the country are exceedingly uniform in their treatment of patients in ague. There is, in most cases, no discrimination of pathological phenomena—a result of their unacquaintance with that mode of curation which is based on a competent knowledge of anatomical and physiological science.

When Intermittent Fever is developed in any one, the first thing commonly had recourse to, is the “*jeringa*” syringe, in the use of which, Peruvian females are adepts: they also are good nurses; the want of their humane assistance has been often felt in a military hospital. “*Lavativa* and *ayuda*” are household words in Peru; either of which terms is used for enema. These *ayudas*, or helps, are composed of simple materials, such as decoction of mal-

lows, with soap, oil, &c. The syringe used for adults is large and effective, and much faith is put in this method of acting on the *primæ viæ*. Where nothing is known about the valve of the colon, it is supposed that when an *ayuda* is administered, it must act directly on the digestive organs. After the bowels have been acted on in this manner, the patient is kept in bed, and, during the cold fit, heat in some form is applied to the inferior extremities, and warm drink is given, which is most eagerly sought by the patient.

While the hot stage is in progress, the treatment is reversed; for now cold liquid is most grateful, which is often water, with lemon or orange juice, and, what is most of all desired by the sick, a piece of ice in the cup; which, slowly imparting its frigorific effect, is much relished by the patient, during the burning heat and tormenting thirst now experienced. The quantity of cold drink which, in these circumstances, some patients would take, is very great, and should be regulated by those in attendance.

When the perspiration appears, it is the custom to give "*agua de sebada*," barley-water, or some other mild diluent not colder than the temperature of the air, and made agreeable to taste, with toast, or vegetable acid and sugar, or "*cremor*," *supertartris potassæ*. When the paroxysm is over, the patient is generally allowed some light food, such as "*caldo de pollo*," chicken-soup, arrow-root, &c. In the intervals between the attacks, the bark is given, and the most common form in which it is administered, is that called "*la tintura de la quina*," which is an infusion of cinchona, and in some cases a tepid infusion, or decoction of the same, is given in the form of enema.

When a person is taken ill, the prime indication is to prevent, if possible, the recurrence of the cold fit. To effect this, various means have been used; one is an emetic, at the time when the shivering is expected to begin—another is, to give opium; and, if time admits, quinine should be given—which is decidedly the better remedy, inasmuch as it generally cures the dis-

case ultimately, and when taken in the form about to be noticed, it often, in a signal manner, broke the morbid concatenation which had been formed in the system; while such means as opium, emetics, &c. are merely palliatives, to give time for the administration of the cinchona in some form.

The quinine appeared to be more effective when combined with the muriate of ammonia and tincture of ginger, than when taken alone. This unchemical mixture was successful in some cases in which the bark, in powder, infusion, and decoction, and also the quinine by itself had failed. Whether it resulted from the mixture acting more efficiently as an antiseptic or a stimulant, or that it operated more immediately on diseased tissues or organs, the *modus operandi* is not known; but under its action, a number of obstinate cases, which had baffled other means, were cured.

RECIPE:—Sulphatis Quininae, grana duodecem; Ammonia Muriatis, grana decem; Tincturae Zingiberis, uncium; Aquae, uncias septem. Misce et fiat mistura.

Of this mixture, two ounces should be taken at a time, one every half-hour, *commencing* two hours before the time when the cold fit is expected. If it is not rejected from the stomach, the anticipated paroxysm is generally prevented, and if it does occur, it is very slight. The quinine, with infusion of quassia, and an aromatic, is, in many cases, a most efficient remedy; but patients often object to it on account of its "*gusto*;" they say that quinine is "*malo*," but with quassia, it is "*malissimo*." In some cases, it is expedient to give the syrupus quininae, especially to children.

Sulphus magnesia, along with quinine, may be given with advantage where it is wished to act gently on the primæ viæ. Quinine, in pills, should not be given to prevent a paroxysm of ague; for besides being a long time in the stomach, even when retained by that organ, they are often not digested, and are eliminated from the alimentary canal entire. The quinine maintained its popularity in Peru during a

short period only. During some time, it was sold at a great price, and was much adulterated, which, together with the belief, that in many cases it induces severe cephalic symptoms, such as tinnitus aurium, headach, deafness, and general restlessness,—these have had the effect of making it much less used than at first. The cinchona, in powder, is seldom used in Peru. That which is brought from Europe is said to be adulterated; and in Peru it is not convenient to reduce the bark to a powder sufficiently fine to be used with success in Intermittent Fever. Besides, the gastric organs are, in most cases, so exceedingly irritable, that the powder in any form is inadmissible. Therefore, the cinchona, in decoction or infusion, is generally used; and, when combined with a vegetable acid, of which there are various at command, it is more acceptable to most patients, and agrees better with the stomach, than the powder. The infusion may often, with benefit, be united with acidum sulphuricum; and, in some cases, where there is reason to believe that there is acidity in the stomach, magnesia, or the carbonate of potass, are excellent adjuvants; the latter being less irritating to a weak stomach than the subcarbonate.

In Peru, the cinchona should never be given along with milk to a patient with Intermittent Fever; nor should milk in any form be taken by one who is in a state of convalescence from that disease. Peruvians, even in health, view with horror such a mixture as that of milk or cream with strawberries, or any acid or subacid fruit; and any medical man who sanctions the use of “*leche sobre el acido*,” would be considered “*muy salvage*”—*a very savage*. Though the decoction of bark is often used by the natives, the infusion is better, as the boiling drives off the aromatic principle, which seems to be useful. The *kind* used should always be the *red table-bark*, if it can be obtained, “*cinchona oblongifolia*,” which grows on the eastern frontier of the department of La Paz. After the disease has been removed, it is requisite to per-

severe in using the quinine, or bark, in some form, during a considerable time. Relapses often occur, in consequence of not adopting precautions, some of which will be given in the sequel.

When an emetic is given to prevent a paroxysm, it should be administered at the moment when the cold stage threatens. In some cases it is effectual. Epecacuanha, or what is still better, as being more speedy in action, sulphas zinci, may ward off an attack; which is an important object gained, as it both saves strength and allows an opportunity for the adoption of those measures which are necessary for the favourable termination of the case.

Tartar emetic should never be given to patients under ague in South Peru, for it has a most injurious effect, inasmuch as it increases the nausea and irritability of the gastric organs, which are peculiarly characteristic of the disease, blisters to the epigastrium, fomentations, &c. often being of no avail.

When opium is taken for the purpose of warding off an attack, it should be given at the time, or rather a little previous to the accession, of the expected cold fit. It should not be given in substance, but in tincture, as in that form it is more prompt in action on the system. A full dose should be administered in hot water, as anything cold taken into the mouth at that juncture, may induce the evil which it is intended to avert. The opium, if retained in the stomach, frequently is effective.

During the cold stage, it was in some cases useful to operate on the spinal column by means of friction; but there are cases in which it would be dangerous to put the patient in the proper position for the operation, such is the degree of weakness exhibited. Care should be taken that the heat applied to the inferior extremities is not such as to scald or burn the parts; for in some cases, the state of collapse is such as to deaden the sensibility of the extremities.

When the hot fit has been formed, the iced drink is not only eagerly taken by the patient, but it has a

most soothing effect on the system generally, and seems to act as a sedative on the præcordia, alleviating the oppression there experienced; and it is also useful in accelerating diaphoresis, so much desired. The fever, in this stage, is often excessively severe; and in some cases, furious delirium supervenes. In such cases, the symptoms should be narrowly watched; and if the patient be of a robust or plethoric habit, and the pulse full and hard, vibrating to touch, blood should be abstracted, either from the arm or topically. But it should be kept in mind, that the disease may soon assume an atonic type, and that the abstraction of blood, in the Intermittent Fever of South Peru, is the exception, and not the rule, for conducting the cure of the disease.

When the febrile symptoms run high, with much pain in head and delirium, it is generally sufficient to apply cooling lotions to the forehead; and in the absence of more scientific means, cloths, rung out of iced water, or otherwise cold, is an excellent remedy. By such means, the relief given to the patient is truly gratifying, and the heat thus subducted is enormous.

The appearance of diaphoresis should be watched, and the cold drink withdrawn at the proper time, otherwise, the recurrence of the cold fit would be incurred; for a double attack is often a result of bad management on the part of the patient himself, or of those in attendance on him. During the sweating stage, it is desirable, if circumstances admit, to change the bed-clothes, taking care not to check perspiration. It has been ascertained that sheets made of cotton are better than linen ones in such an emergency. When perspiration has ceased, or nearly so, there is often an inclination for food; but great care should be taken not to allow any animal substance, such as flesh of any kind: the ordinary chicken-soup of the country, with toasted bread if desired, or sago, arrow-root, &c. is quite enough. Many a relapse is induced, and case protracted, by improper diet. When the patient is convalescent, then he may be permitted to take a

moderate allowance of fish, of which a variety of excellent quality are to be found all along the coast—particularly the corvinitas and casonsitás, “*Sciænula Sparulus*,” and many others—which are both pleasant to taste and easily digested.

Fruits, on the coast of Peru, are numerous, of excellent quality and delicious flavour; but for patients suffering under Intermittent Fever, there are few which the physician should recommend—or rather, it is his duty to prohibit the most of these fine fruits to such patients, as they value health.

It is not necessary to mention all; but some of those to be obtained at Tacna may be named. There are grapes in variety; olives; paltas (*Laurus Persea*); sweet and sour oranges; sour and sweet lemons; mellons, of different sorts; limes; quinces; pears and apples; tunas, or Indian figs; ceruelas; bananas and plantains; citrons, and peaches of various kinds; the granadilla, or fruit of the passion-flower; nectorines; lucumas; figs of different sorts; and the chirimoya is brought from Asapa, a few leagues off,—it is a most rich and luscious fruit (*Anona Reticulata*). But to those who are ill with ague in Peru, or who are convalescent from that disease, chirimoyas and melons, grapes, bananas, and other fine fruits, are most noxious. There are also pomegranates, and other fruits, at Tacna; strawberries of great size, and other fruits, are brought in a preserved state from Cochabamba; and pine-apples are sent down from La Paz.

For the convalescent from ague, none of all these fruits is better than the *sweet lemon*; it quenches thirst, and is peculiarly grateful. The vegetable acids are invaluable in such a climate, for combination with the diluents used, and especially with the infusion of bark. It is essential to attend to the condition of the hypatic system, along with other means. Small doses of submur. hydrarg. are exceedingly useful in exciting healthy action in the alvine canal. If such treatment is not adopted, in many cases, quinine or cinchona, in any form, will be given in vain; cases may not only

be protracted, but patients exhibit those symptoms of general dropsy which are often met with in Peru. In some cases, it is of consequence to remove mental anxiety, and to recommend a change of climate.

Bilious Remittent Fever is frequently seen in Southern Peru; and when it does not prove immediately fatal, it often terminates in the intermittent type of tertian, or quotidian; and, in some cases, it ultimately exhibits a decidedly septic diathesis in "*el fiebre perniciosa*" of the Peruvian.

The remittent type is generally severe there, and requires prompt and active treatment. The utter worthlessness of the "*medicine expectante*," when applied in some cases of acute diseases, is well illustrated in Bilious Remittent Fever, as seen in Peru.

There is observed, in such cases, symptoms of the system being surcharged with bile; the pulse is full, hard, and bounding to touch; skin hot; tongue furred; severe pain in head, and often delirium; the urine is highly coloured, or, in the language of the country, "*muy incindido*;" obstinate constipation is generally a concomitant, and in many cases, vomiting is a distressing symptom of the disease. In such cases, neither the dogmas of the humoral pathology, the practice of Galen, nor the theories and practice of some modern professors, should influence the attendant physician. Blood should be taken from the system; not *two ounces*, which is a favourite quantity in Peru, but to a considerable extent; more or less according to age, habit of body, and other circumstances. The blood abstracted in such cases, often exhibits a yellow appearance, from the return of bile into the circulation. The bowels must be acted on with effect. After the larger intestines have been unloaded in the usual manner, by means of enemata, and gastric irritation soothed by the usual resources of art, means should be exercised to emulge the biliary vessels; for if the hepatic system and smaller intestines are not relieved from their vitiated charge, within forty-eight hours from the supervention of the above-noted symptoms, death generally ensues.

The submurias hydrarg. should be given, but not in large doses—five grains at a time is enough,—and afterwards oleum ricini, which, with the previous depletion, and warm bath, if it can be procured, is often attended with the wished-for result. If necessary, the cathartic may be repeated, or varied, as may be expedient, taking care not to induce hypercarthisis. The operation of the medicine removes an enormous quantity of feculent matter; in all, extremely offensive in appearance, &c. and in some cases, black almost as pitch. The quantity and appearance of these dejections has in some instances induced the beholders to discard their prejudices, to reverse their favourite adage, and to admit that “*el enfermo sana porque evacua.*” When the febrile paroxysm is abated, and the symptoms generally are such as to render expedient the administration of the quinine, or cinchona, it should be given without delay. By such means, it often happened that the patient, within a short period, exhibited perfect convalescence.

Peruvians often designate as tertian fever, various ailments in which the consecutive stages of Intermittent Fever are not observed. “*Terciana*” is a sort of family phrase in many parts of Peru; and in consequence of its frequent misapplication, it is the duty of the physician, in every case, to take and weigh evidence; otherwise, he may be led astray in the treatment.

Though cases are often thus misnamed by the patient or his friends, yet there are various affections to which residents there are subject, which, though they do not present all the symptoms observed in regular Intermittent Fever, yet require somewhat similar treatment, in so far as relates to the use of quinine or cinchona. *Terciana en la cabeza* (tertian in the head), a kind of hemicrania, with intermissions; *terciana boba* (or silly tertian), which is merely a slight febrile affection, returning at irregular intervals, but without the usual symptoms of ague; *terciana en el estomago* (tertian in the stomach), where the

gastric irritation concomitant on ague, is severe; *terciana en el ojo* (tertian in one eye); *terciana syncopal* (fainting or dumb tertian);—all these types of the disease are best treated by inducing healthy action in the alvine canal, and the use of quinine or bark. *Terciana en el ojo*, or tertian in one eye, is often a tedious malady. The treatment of it should always be conducted on *general principles*. When such a case is treated as only a local affection, signal failure is sure to follow. The eye is subject to paroxysms of pain at irregular intervals; and in some cases, especially where the patient exhibits a strumous diathesis, it becomes blood-shot, the relaxed vessels giving entrance to the red globules; and when seen by one who is not acquainted with the disease, it may be mistaken for acute ophthalmia. An instructive case was that of an English gentleman, a merchant at Tacna, who, in 1828, suffered from *terciana en el ojo*; his business being important, and not having patience under the usual treatment, a consultation on the case was held at Arica, off which port a man-of-war was stationed. The result of the consultation was, depletion from the arm; the temporal artery on the affected side was opened, and bled copiously; the vessels of the eye were divided, cataplasms and collyria were used, with other antiphlogistic means; but all in vain; the case was very protracted; but the patient recovered under the use of quinine, which was taken in a solution of sulphus magnesii, during a long period.* “*Terciana syncopal*,” or fainting tertian, is a type of the disease, which came under observation, chiefly in Moquegua, during a short residence there. That city is distant 120 miles from Tacna, and 40 miles from the sea. It has a population of 10,000, and is situated in one of the most insalubrious localities in Peru. The valley is extremely fertile; vast quantities of grapes are reared; sugar also is grown, with fruits and vegetables in profusion. The place is watered by a river of some

* He is still in Peru.

magnitude, which is used for the plantations, by means of irrigation, with much ingenuity. But both the town and its vicinity are exceedingly unhealthy; and the rate of mortality, in all seasons, is great, and in some it is dreadfully so. There is reason to believe that the town might be made less deadly, by the enforcement of police regulations for the removal of offensive matters from streets and *corals* (court-yards); but, up to 1836, police there was none. One case of terciana syncopal may be noticed, which occurred in Moquegua in April 1835: it was that of a negro, aged forty, who managed an estate for a gentleman who lived in the town. This patient was in the field, as usual, in the morning, when he fell on the ground, and was conveyed on a mule to his master's house in town. When first seen after his arrival, he was more like a corpse than a living man; the pulse at the wrist was scarcely felt; skin cold and dry to touch; little or no shivering; and he could not articulate; but his vision and hearing seemed to be sound. On inquiring at the attendants, it appeared that there had not been any discharge, either from the bladder or rectum, since the attack.

The first thing done, was to put the patient into a warm bath, which seemed to operate like a charm, for the breathing became free, the pulse rose, and speech returned. It was now ascertained, that during several days prior to the attack, there had not been any movement from the alvine canal. Copious enemas were given, and several doses of cathartics, consisting of submurias hydrarg. cum pulvis rhei, and afterwards olium ricini. By these means, an enormous quantity of vitiated bile and other matters were voided; and, with quinine in the infusion of quassia, and good nursing, he was well within ten days from the time of attack. In this case there was no recurrence of the paroxysm. The patient, after being taken out of the warm bath, exhibited the hot and sweating stages; but being of a docile disposition, and willing to submit to the necessary treatment, he took freely of the quinine and quassia, and other me-

dicines which were given. It was stated, that such cases there are generally fatal, and that those who are so taken ill, are given up for lost. In this case, it appeared as if the warm bath and the efficient operation on the primæ viæ, were the more immediate means by which it had a favourable issue. This black man was of great value to his owner, for he was a slave; but he presented a physiognomy and a facial angle, which would have been admired even by Camper himself.*

All these types of Intermittent generally yield to cinchona in some form; but it must be noted, that cases occasionally appear, in which neither quinine nor bark can be made available, because there are individuals so constituted as to reject the cinchona, however it may be given. In these circumstances, it is incumbent on the physician to try something else. Coffee, in the form of infusion or decoction, has, in some cases, proved efficacious in the Intermittent Fever of Peru. One case which excited much notice at the time, in the locality where it occurred, was that of an English lady at Arica, in 1826. The cold fits were excessively severe, and vomiting accompanied every paroxysm. Both quinine and bark, in every known form, were administered during the intervals of attack, but were rejected by the stomach. No symptoms of gastritis were present; and as the patient was *enciante*, there was imminent danger from a continuation of the paroxysms, as the concentration of blood in the larger vessels, and pressure on the contents of the abdomen, are often excessive during the cold stage. A strong infusion of coffee was given a little before the expected cold fit. It was taken hot as could be swallowed, and was always retained. The type was single tertion, which was completely removed without any other medicine than the coffee and mild aperients. This patient lived in Peru during twelve years afterwards, without another attack of ague.†—

* No slaves have been imported into Peru during the last 20 years.

† She is now in England.

Coffee of superior quality grows in the department of La Paz.

In South Peru, many cases of chronic ague are seen, in which Intermittent Fever has been allowed to run its course, or has been badly treated. In such cases, dropsical affections, enlarged spleen, and indurated liver, come under observation. The treatment of such cases should be conducted with great caution, as in general the system has been much reduced. Mercurial inunction, emetics, and tonic regimen, attending to the state of the alvine canal, together with the use of the quinine or bark,—these seem to be of use in treating such cases, which are often very obstinate. Emetics seem to have the effect of exciting the absorbents to take up the effused matter, which is reconveyed into the circulation. The warm bath is also a useful adjunct; and by perseverance in such means, patients sometimes recover. Blood taken from the system in such cases, shows a deficiency both of fibrine and crassamentum: and sanguineous depletion should not be adopted, though it is a favourite operation in the hands of some native practitioners. Gentlemen who do not bleed nor use any antiphlogistic means in the treatment of pleuritis and other similar diseases, are exceedingly enamoured with “*sangrias cortas*,” in numerous cases where patients are suffering from the sanguineous fluid being both deficient in quantity and deteriorated in quality. There is reason to believe that these “*sangrias cortas*,” or *little bleedings*, effect more mischief in Peru, than all the evils which have been ascribed to Pandora’s box.

Surely that man has much to answer for, who, with or without any medical education or knowledge of diseases, enters the chambers of the sick, armed with lancet or cupping instruments, and that he may appear to be doing something, or for the purpose of obtaining a paltry *fee*, abstracts *blood* from those who are in need of very different treatment.

Those attacks of ephemeral ague which are seen

in the elevated regions of Peru, are dangerous, and should be closely watched; for on those sublime heights there is a marked tendency in diseases to exhibit a sthenic type; both serous and mucous tissues very often presenting acute inflammation, which, if not promptly checked by timous depletion, generally has a fatal termination.

There, the cerebral and thóracic regions are peculiarly subject to inflammatory attacks; and it has been observed, that while diseases in those elevated districts never assume nor terminate in an Intermittent type, as is seen on the coast, yet a severe attack of acute inflammation is in some cases experienced subsequent to a fit of ephemeral ague. In such cases, no time is to be lost. The patient should be placed in the perpendicular posture, and bled from a large orifice, *ad deliquium animi quamprimum*. People in these mountainous countries endure the abstraction of blood better than those on the coast: altogether, the former are a more hardy race.

The scope of this essay does not admit a discussion of the question,—Are the vessels of an inflamed part in a state of contraction or dilatation? But experience proves that the most effective mode of checking an attack of acute inflammation, such as pneumonia, is to induce syncope. Where that is effected in proper time, with other necessary treatment, it rarely happens that the case terminates in purulent infiltration and death.

It is of the utmost importance to discriminate between a sudden attack of inflammation, and the severe pain and constriction in the organs of respiration, which are experienced by almost every one who, for the first time, ascends to Bolivia from the coast, and who attempts to climb on foot when at a great elevation, either on the mountains, or some of the streets in Potosi, such as that which leads from the mint-house to the palace or cathedral in the Plaza. In the latter case, the pain in thorax and difficulty in breathing are removed by remaining a short time stationary.*

* *Vide* Note C.

Neither the use of arsenic, nor bleeding in the cold stage of Intermittent Fever, came under observation. Though many cases are very severe, yet the disease, if not complicated, seldom proves fatal under proper treatment; and as arsenic is apt to accumulate in the system, for that and other reasons it was not given; neither was it considered expedient to bleed during the cold fit. He must be a very bold man, who, in private practice in Peru, will carry into execution the experiment on a scale sufficiently extensive to warrant him thereon to found a system.

For the prevention of Intermittent Fever in Peru, attention to a few simple rules may be useful. The most important is, to avoid those localities noted for the existence of malaria; and when that cannot be done, residents should remain within doors in the morning till at least an hour after sunrise, avoiding unnecessary exposure to the dew of evening, and *never sleeping on the ground during night*. As a farther prophylactic against ague there, coffee for breakfast is better than tea or chocolate; and generous diet is of great importance. Beef, bread, wine, and water, of good quality, are very conducive to the preservation of health in Peru. Also, the hypatic and cuticular systems should if possible be maintained in healthy action, and all intemperance should be avoided.

Since the termination of the late fatal expedition to the Niger, some writers have suggested, that, had the bodies of those engaged in it been anointed with oil, the catastrophe might have been averted. An inference has also been drawn from what is recorded as having happened during the plague in London in 1665, and at Malta in 1804; but it should be noted, that the deaths on the Niger resulted from a disease not communicable by *touch*, but from fever, the remote or exciting cause of which is believed to be *malaria*, which may, and probably does affect the system through the medium of the sensorium, or the gastric or respiratory organs; so that it must be exceedingly danger-

ous to risk another expedition to explore the banks of the Niger, trusting to the inunction of the body with oil, or any such application.

Experience proves beyond a doubt, that in Peru, the malaria is more apt to affect those whose persons are in a filthy or greasy condition, than those whose habits or circumstances are such as to admit of personal cleanliness and a frequent change of apparel.

In conclusion, it may be remarked, that though residents in Peru are peculiarly exposed to Intermittent Fever, yet the beneficence of the great Author of nature, is richly displayed in the varied and efficient means which are there provided for alleviating and curing the malady; and though a wide field is presented for the exercise of the industry and ingenuity of man in the proper application of such means, yet, with all the experience and improved modes of application of the present time, it may still be allowable to adopt the words of the celebrated Leyden professor—"Nullum se cognovisse remedium, quin solo tempestivo usu tale fieret."

NOTES.

NOTE A.

I have known eight excellent crops of alfalfa (lucerne), obtained annually from the same spot, and that too, without the use of guano or manure of any sort.

In such cases, the soil consists of disintegrated volcanic rocks, with a portion of soda, and the irrigation, which is attended to most assiduously, is effected by means of water from the Andes, which, during a part of the year, is chiefly melted snow containing ammonia; these, with the solar heat in such a region, will explain to the chemical agriculturist this extreme fertility.

NOTE B.

This icy region of the Andes, which forms the western boundary of the pampas of Buenos Ayres throughout their whole extent, may be the *Antarctic* Circle referred to by Baron Humboldt, and quoted in Mr. Alison's celebrated History of Europe. It is true that the Baron Humboldt never was in South Peru, nor in Bolivia, neither did he ever see the pampas of Buenos Ayres, but the Baron is not such a tyro in geography, as to state to the world, that the pampas (plains) of Buenos Ayres extend to the Antarctic Circle in a literal sense. It may be supposed, that Baron Humboldt was only availing himself of the privilege which is given to poets and modern philosophers, *i. e.* exercise of the imagination; and surely such a philosopher as the Baron Humboldt, may be allowed 10 or more degrees of latitude for the exercise of *his* imagination.

NOTE C.

Those gentlemen who lately ascended in a balloon in England, to an unprecedented elevation, were pleased to draw a most unphilosophical conclusion from what they experienced on that occasion. They concluded, that because while in the car of the balloon, they could respire without pain, that the statements of travellers, who, when *climbing on foot* at great heights, have felt both pain in the lungs, and impeded respiration, that such statements are not correct. Before such an inference is drawn, all such sceptics should take a trip to Potosi, *via* Arica, on the coast of the Pacific Ocean, by which route, it is necessary, prior to arriving on the table-land of Bolivia, to attain an elevation of nearly sixteen thousand feet above the level of the ocean; and if they attempt to *climb on foot*, when near the crest of the Cordillera, they will soon be convinced that the balloon arguments are not more logical than those of the Welshman, by which he endeavoured to prove that Maccdon and Monmouth are one and the same country.







